

## DOCTOR OF PHILOSOPHY

### Barriers to recovery after Coronary Artery Bypass Grafting surgery

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# Barriers to recovery after Coronary Artery Bypass Grafting surgery

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A thesis submitted in partial fulfilment of the requirements of  
Coventry University for the degree of Doctor of Philosophy

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In collaboration with University Hospitals of Coventry and Warwickshire NHS  
Trust and Royal Wolverhampton Hospitals NHS Trust

## Abstract

### ***Introduction***

Coronary artery bypass grafting surgery is an effective treatment for coronary heart disease for many patients; however, evidence suggests that there are some patients who do not report a good post-operative recovery. Although several studies have begun investigating possible reasons for these observations, little is known about the impact of CABG on quality of life and there still remains a lack of information that can help clinicians identify those people more likely to experience poorer recovery so that interventions can be targeted appropriately.

### ***Aims***

The overall aim was to investigate barriers to and facilitators of recovery after CABG.

### ***Method***

Phase 1 was a retrospective qualitative study involving semi-structured interviews with eleven patients who had undergone CABG and with ten health professionals experienced in caring for these patients. Data were analysed using thematic analysis. Phase 2 was a prospective study comprising two components, questionnaire and interview. The questionnaire included measures of quality of life, perceived recovery, demographic and psychosocial variables and was administered prior to surgery and at six and twelve months post-surgery. A sample of ten people who completed questionnaires were interviewed at the same time points and data analysed using framework analysis.

### ***Results***

Interview data described the patient experience of undergoing CABG and identified components of a good recovery from the patient perspective. Patient and health professional participants identified numerous barriers and facilitators to recovery at three key time points - prior to surgery, during the hospital in-patient stay and post-CABG - and noted the complex inter-relationships

between them, thus emphasising the need for a holistic approach to investigating recovery. Questionnaire data described the pattern of psychosocial functioning, quality of life and perceived recovery across the surgical pathway and identified depression and self-efficacy as the main predictors of post-CABG quality of life and perceived recovery. Using interview and questionnaire data a model of recovery is proposed.

### ***Conclusions***

Findings from this research have identified a complex inter-related network of barriers and facilitators to recovery, suggested the possible mechanisms by which they impact on post-CABG outcome and identified recommendations for clinical practice.

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## Introduction

### 1. OVERVIEW

Coronary heart disease (CHD) is the main cause of death in the United Kingdom (UK), with over 117,000 deaths a year (Department of Health, 2004), representing 1 in 5 deaths in males and 1 in 6 deaths in females (Office for National Statistics, 2003). Premature deaths from CHD are high at 22% in men and 13% in women (British Heart Foundation (BHF), 2004). The UK has one of the highest death rates from CHD in the developed world (BHF, 2004). Mortality from CHD is decreasing, due largely to a reduction in contributing risk factors. However, morbidity is increasing (BHF, 2004) so that a larger number of people than ever are living with the effects of a disease that has great personal and financial implications not just to individuals but also to the health service and society as a whole (NHS CRD, 1998; Liu *et al.*, 2002).

Improving care and reducing the burden of coronary heart disease (CHD) is a major Government priority in England, as set out in a National Service Framework (NSF), with a greater emphasis on patient-centred care than ever before (Department of Health 2000a). Additionally, specific goals for the health service to achieve in the treatment of CHD have been laid down in the NSF (Department of Health, 2000a, 2000b), including increased access to revascularisation procedures. These include percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG) procedures. Whilst the number of CABG procedures has decreased compared to an increase in the PCI procedures (Healthcare Commission, 2005a) there are over 20,000 CABG operations carried out each year (British Cardiovascular Intervention Society, 2006).

The objectives of CABG have been described as: to provide relief from symptoms of angina, to increase survival, and to improve quality of life (Zamvar, 2004). The surgery is very effective at relieving symptoms of angina (Rogers *et al.*, 1990), reduces mortality when compared to medical therapy (Yusuf and Zucker, 1994) and is successful in increasing well-being (BHF, 2001).

However, evidence suggests that an improved cardiac outcome from CABG does not necessarily correspond to a good recovery, resumption of normal activities or improved quality of life and, therefore, there are some patients who do not report a good recovery nor consider the surgery to have been worthwhile (Ellard, 2003; Rymaszewska *et al.*, 2003).

Several studies have begun investigating possible reasons for these observations of poorer than expected recovery and have suggested factors including, the presence of depression and/or anxiety (Rymaszewska *et al.*, 2003), demographic factors (Lindquist *et al.*, 2003), social factors (Kulik *et al.*, 1996), lower self-esteem (Jenkins *et al.*, 1996), perceived control (Moser and Dracup, 1995), coping (Schroder *et al.*, 1998), poor perceived social support (Hamalainen *et al.*, 2000) and pessimism (Mahler and Kulik, 2000).

Despite existing research, comparatively little is known about the impact of CABG on quality of life (Hedeshian *et al.*, 2002) and there still remains a dearth of information that can help clinicians identify those people more likely to experience poorer recovery (Jarvinen *et al.*, 2003) so that interventions can be targeted appropriately. There also appears to be a lack of consensus on the relative importance of various factors, possibly due to the varying methods of assessment, different international patient populations and a lack of investigation into global recovery. Additionally, although patient-centred care is a pledge of the UK Government (Department of Health, 2000b) there has been little published research to date that has identified the patient's perceived barriers to recovery after CABG. Yet "...no matter how successful the treatment is from the physicians' point of view, the treatment is not successful for the patients unless they perceive it to be so." (Clancy *et al.*, 1984, pp174).

## **2. AIMS**

To investigate barriers to recovery after CABG.

### **PHASE I AIM**

To describe the recovery trajectory after CABG and to identify the perceived barriers to recovery after elective CABG from the perspectives of patients and health professionals.

- To investigate patients' perceived barriers and facilitators to recovery
- To investigate health professionals' perceptions of barriers and facilitators to patient recovery at different stages in the CABG procedure pathway
- To pilot the questionnaires that will be used in Phase II.

### **PHASE II AIMS**

To investigate factors related to recovery after elective CABG in a longitudinal prospective study from pre-surgery to one year post-surgery.

- Identify the proportion of patients that do not report an improved quality of life or complete recovery after elective CABG
- Describe the pattern (and proportion) of anxiety, depression, perceived stress and optimism along the recovery pathway
- Identify predictors of post-surgical quality of life and perceived recovery
- Further investigate facilitators and barriers to recovery
- Develop a model of recovery after CABG.

## **3. SETTING**

The research was conducted with participants from University Hospitals Coventry and Warwickshire NHS Trust (University Hospital Coventry) and Royal Wolverhampton Hospital NHS Trust (New Cross Hospital Wolverhampton).

## **4. THESIS STRUCTURE**

The remainder of this thesis is structured around a further 6 chapters.

### ***Chapter 2 – Literature review***

This chapter summarises the relevant literature concerning psychological recovery after CABG. The literature identifies numerous factors that may be important but does not indicate how these factors affect recovery nor how these factors interact. Little research presents views of patients or health professionals on what constitutes a good recovery or the possible barriers and facilitators to this.

### ***Chapter 3 – Methodology***

This chapter summarises the methodology used in the research including the types of qualitative analysis used and the rationale for the measures included in the questionnaire.

### ***Chapter 4 – Phase 1***

This chapter presents a retrospective qualitative research study. Semi-structured interviews were conducted with eleven patients who had undergone CABG in the past six to twelve months and with ten health professionals experienced in caring for these patients. The findings identify several inter-related barriers and facilitators to recovery after CABG and suggest mechanisms by which these factors operate. The importance of a holistic approach to investigating recovery was highlighted.

### ***Chapter 5 – Phase 2: Interviews***

This chapter presents a prospective qualitative research study. Semi structured interviews were conducted with ten patients at three time-points along their CABG pathway; prior to surgery, at six- and twelve-months post-surgery. Findings suggested how various barriers and facilitators could affect recovery

and provided further detail to explore the quantitative findings presented in *Chapter 6*.

***Chapter 6 – Phase 2: Predicting quality of life and perceived recovery***

This chapter presents a prospective quantitative research study. Findings from the questionnaire data are reported. In particular the statistical analysis identifying the main predictors of perceived recovery and quality of life post-CABG are discussed.

***Chapter 7 – Discussion***

This chapter presents a summary of the findings and discusses the extent to which the aims of the research have been met. A critique of the methodology used is included as are suggestions for future research and implications for clinical practice.

## Background

### 1 SEARCH STRATEGY

A search strategy was developed and applied to two main databases; MEDLINE and PSYCHINFO. Details of the search terms can be found in Appendix 1. Searches were limited to articles in English, given the difficulties of obtaining translations, and limited to articles from 1996 onwards. Coronary Artery Bypass Grafting (CABG) is a rapidly changing area and recent published articles are more likely to reflect current surgical techniques. Recent review studies (for example, Johansson *et al.*, 2004) also restricted the inclusion of articles to those recently published. Additionally, only articles in Journals, books and reports were reviewed. Abstracts from conferences and theses were not reviewed given the difficulties in obtaining copies of the original material. Reference lists of papers identified were also checked for additional articles.

### 2 CORONARY HEART DISEASE

Coronary Heart Disease (CHD) refers to the restriction of blood through the coronary arteries due to them becoming narrowed or completely blocked (Quinn *et al.*, 2002). Whilst CHD can be asymptomatic, with people unaware they have the disease, it is typically characterised by chest pain and breathlessness. If the coronary arteries become completely blocked, the person may experience a myocardial infarction (MI). The process of atherosclerosis is complex and certain risk factors known to influence it have been identified. These include: smoking, obesity, lack of exercise, high blood pressure, high blood cholesterol levels, family history of heart disease, diabetes (BHF, 2004), psychological stress and certain bacterial and viral infections (Quinn *et al.*, 2002).

#### 2.1 TREATMENT

Treatment options for CHD vary but can include, diet and lifestyle modification, drug treatments and surgical interventions. The symptoms of CHD - angina and breathlessness - can be eased with drug treatments and lifestyle modification, for example stopping smoking, and eating a healthy diet. However, for many



people, revascularisation procedures are necessary. These include percutaneous coronary intervention (PCI), and coronary artery bypass grafting (CABG) procedures, with just under 63000 PCI and 30,000 CABG procedures carried out each year in the UK (Allender *et al.*, 2006). A report published in 2005 by the Healthcare Commission and supported by 2005 audit data from the British Cardiovascular Intervention Society (2006) stated that there has been a continued increase in the number of PCIs carried out with three times as many of these as CABG procedures, the number of which has decreased. However, a recent study (Zhang *et al.*, 2004) suggested that CABG had greater benefits than PCI for men at six and twelve months follow-up and for women at six months follow-up (with no difference at twelve months).

### 2.1.1 CORONARY ARTERY BYPASS GRAFTING

The procedure involves bypassing a narrowed or blocked artery by grafting a new blood vessel (such as a mammary artery or a vein from the leg) from the aorta to a point after the narrowed or blocked area in the coronary artery (See Figure 1). Typically more than one graft is done during the operation; single grafts are uncommon. The operation usually lasts three to five hours and patients stay in hospital for five to seven days post-surgery (Mullany, 2003). The procedure has a low post-operative mortality rate of approximately two to three percent within 30 days of the operation (Society of Cardiothoracic Surgeons, 2002) and two percent for University Hospitals of Coventry and Warwickshire NHS Trust (Patel, 2001). CABG is effective in relieving symptoms (Rogers *et al.*, 1990) although around five to ten percent of patients require further bypass or revascularisation in the future (BHF, 2001).

*Figure 1: Diagram of CABG*

This diagram, which is a picture of a heart shows what coronary artery bypass surgery does, has been removed for copyright reasons.

*On-Pump/off-pump CABG*

Usually CABG is carried out with the use of cardiopulmonary bypass (CPB). In this type of procedure, the heart is stopped during the operation with the CPB machine taking over the functions of the heart by pumping oxygenated blood around the body. In recent years some surgeons carry out CABG without the use of CPB so the heart is still beating during the operation, albeit at a slower rate than usual. This procedure is referred to as off-pump CABG (OPCABG) and, although not suitable for all patients, is as safe as CABG with CPB (NICE, 2004). However, not all surgeons carry out the procedure. A meta-analysis of randomised trials (Cheng *et al.*, 2005) found no difference between CABG and OPCABG in terms of mortality rates, incidence of stroke, renal function and early neurological functioning. However, the authors did find that OPCABG resulted in a shorter hospital stay and less neurological deficits at two to six months post-surgery while other researchers have identified OPCABG as

resulting in a faster recovery and lower morbidity (Angelini *et al.*, 2002; Lee *et al.*, 2002).

### 2.1.2 REHABILITATION

All patients suffering from CHD and admitted to hospital should be offered rehabilitation comprising four phases (Department of Health, 2000a). Exact content of the rehabilitation provided varies by locality but the National Service Framework indicates that the following elements be included at various stages of recovery: assessment of cardiac risk and rehabilitation needs, structured exercise sessions, access to advice, support and interventions about adopting or maintaining a healthy lifestyle, and involvement with local cardiac support groups (Department of Health, 2000a). Typically phases three and four comprise participation in an exercise rehabilitation programme run by health professionals, often a physiotherapist, either at the hospital Trust or within the community. Some patients prefer to utilise a heart manual that provides the same information to follow at home rather than taking part in the formal exercise rehabilitation classes.

Participation on rehabilitation programmes, whilst encouraged, is voluntary. Recent figures indicate that in England in 2000 just 45-67% of eligible patients were referred for cardiac rehabilitation, with uptake at 27-41% (Beswick *et al.*, 2004). Benefits of attendance have been well documented (e.g., a review by Lear and Ignaszewski, 2001). A longitudinal UK study (n=183) found those who attended rehabilitation classes experienced better outcomes at an average of 16.4 months post surgery compared to non-attenders on several quality of life domains, including improved general health and better physical and social functioning (Lindsay *et al.*, 2003). A later qualitative study (Tolmie *et al.*, 2006) reported patients identified social support as a benefit of attending. Other research has also found benefits from attending exercise rehabilitation in decreasing mortality (Jolliffe *et al.*, 2004) and encouraging secondary prevention behaviours such as stopping smoking, exercising, losing weight and eating more healthily (Detry *et al.*, 2001; King *et al.*, 2001).

Given these benefits, some studies have focused on possible reasons for non-attendance, although more research is clearly needed. A small UK study of patients post MI or CABG found just 40% of people (n=55) were attending rehabilitation classes at six months post-surgery and identified demographic factors, such as being older and being unemployed, linked to non-attendance (Cooper *et al.*, 1999). This finding was not replicated by later, larger, studies that found no difference in these demographics (Lindsay *et al.*, 2003; Whitmarsh *et al.*, 2003). Although, as mentioned earlier, Lindsay *et al.* (2006) reported that social support was cited as a benefit of attendance, an earlier large study (n=304) in Canada by King *et al.* (2001) found no difference between attenders and non-attenders in terms of social support. Non-attendance was significantly related to certain illness perceptions; those believing they did not have control over their illness and who did not think their lifestyle may have contributed to their illness were less likely to attend (Cooper *et al.*, 1999; Whitmarsh *et al.*, 2003).

## 2.2 DEFINING RECOVERY

The goals of CABG are three-fold (Duits *et al.*, 1997; Zamvar, 2004): to increase survival, provide relief from symptoms of angina and improve quality of life. The first two goals are objectively measurable, the third, however, refers to an amorphous, multi-dimensional concept that is highly individualistic. How can an improvement in quality of life be determined? “There is a lack of ‘golden standards’ for clinically important change in quality of life scores in CABG surgery patients” (Jarvinen *et al.*, 2003, p755). Whilst there is, albeit limited, literature asking *if* patients consider they have made a good recovery (Jaarsma and Kasternans, 1997; Falcoz *et al.*, 2003), there appears to be no literature that has asked patients *what* they feel would constitute a ‘good recovery’ after CABG. In the absence of information on what patients consider recovery to be, various indicators are used to assess this outcome. Researchers acknowledge that recovery is a multi-faceted concept encompassing *both* medical and psychosocial factors (Duits *et al.*, 1997; King, 2000). A very commonly used indicator of recovery is, therefore, quality of life, as it is one of the goals of

CABG and is a multi-dimensional construct that includes physical and emotional well-being (King *et al.*, 1992), and is thus considered by some to be the most appropriate outcome measure for CABG (Jolliffe *et al.*, 2004).

Together with the debate over how to measure recovery, there is the question of when to measure it. What is an appropriate time span for recovery to take place? Researchers assess recovery at time points as varied as three months to five years. Typically, outcome at one year is assessed, although some suggest that this is also a relatively short time at which to assess recovery (Falcoz *et al.*, 2003; Jarvinen *et al.*, 2003). A recent Australian study (Worcester *et al.*, 2007) identified that the majority of quality of life improvements occurred within the first two months with little change thereafter. However, one large US study of functional status among those over 65 years (Barnett and Halpin, 2003) found improvements over two years post-CABG suggesting that for some patients the benefits of surgery may not be apparent for some time. However, assessing outcome too long after CABG may assess the impact of other life events, rather than the effect of surgery.

There is a wealth of evidence that shows the majority of patients do achieve the three goals of surgery mentioned earlier (King *et al.*, 1992; Oelofsen *et al.*, 1998). CABG reduces mortality when compared to medical therapy (Yusuf and Zucker, 1994) and for many, angina symptoms disappear or, if still present, are at much lower levels than pre-operatively (Lindsay *et al.*, 2001; Pierson *et al.*, 2003). However, a minority of patients, most commonly those aged over 75 years, experience a return of their angina. Almost 25% of those over 75 years reported angina returning compared to 6% of patients under 64 years (Jarvinen *et al.*, 2003).

Large-scale international research studies looking at the third goal, quality of life, indicates that a large proportion of people experience an increase in overall quality of life post-CABG (Jaarsma and Kastermans, 1997; Bute *et al.*, 2003; Jarvinen *et al.*, 2004; Elliott *et al.*, 2005; Kattainen *et al.*, 2006), although some studies report figures of only 50% showing an improvement in quality of life at one year post-surgery (Falcoz *et al.* 2003) and others have found some patients

who experience a decline in quality of life after CABG (Lindsay *et al.*, 2000a; Hawkes and Mortensen, 2006).

Quality of life as a multidimensional issue (as discussed by Swenson and Clinch, 2000, from their review of the literature) includes numerous aspects such as anxiety, depression and physical functioning. Some of these aspects have been assessed in isolation in some studies. Anxiety and depression decrease after surgery, although often remaining higher than general population norms (Lindquist *et al.*, 2003; Rymaszewska *et al.*, 2003) and Pierson *et al.* (2003) reported the majority of patients returned to pre-symptomatic levels of physical functioning by one year post-CABG. Return to work has been an important outcome variable and much researched (for example, Clancy *et al.*, 1984) until quite recently. Whilst research shows a large proportion returning to work (King *et al.*, 1992; Mittag *et al.*, 2001), these studies also report that for many not returning to work is not necessarily associated with poor recovery. Instead Oelofsen *et al.* (1998) note that for many participants not returning to work improved quality of life by allowing them to pursue previously neglected areas of their life. With the increasing age of the patients now undergoing CABG, return to work is likely to be a less pertinent variable to assess when looking at recovery after CABG, as many are around or beyond retirement age.

When asked if they thought the surgery was worthwhile, King *et al.* (1992) report 43% of patients saying it was, because of the benefit of improved functioning, and 42% because the alternative was death or MI (categories not exclusive). However, 10% were not sure if the surgery was worthwhile and 5% said it was not. Of those who did not feel CABG was worthwhile, many were those who had recurring angina or other non-cardiac-related illnesses. A more recent study similarly asked patients if surgery fulfilled their expectations, 20% were not sure or said it did not (Oelofsen *et al.*, 1998). Although Oelofsen *et al.* asked this question of just 31 patients the finding that those who were dissatisfied with the outcome of surgery felt worse and more functionally impaired complements previous work.

A review of existing findings indicated that many patients, around 20-25%, experience psychological problems after CABG (Duits *et al.*, 1997). Given this, identifying those people who experience problems after surgery and understanding why some people do not experience good post-CABG recovery is vital in developing interventions that can be targeted appropriately to maximise the benefits from the surgery (Duits *et al.*, 2002).

### **3 DETERMINANTS OF RECOVERY**

Despite this evidence suggesting the majority of patients show a recovery of clinical heart functioning and a reduction of angina symptoms, patients themselves do not always perceive any beneficial outcome from the procedure (Ellard, 2003; Rymaszewska *et al.*, 2003). This is of concern given that CABG is a major surgical procedure. This complex procedure also requires intensive specialist nursing care in the immediate post-operative period and is costly to the NHS to provide. Identifying those individuals less likely to experience a good recovery is, therefore, of great importance so that targeted intervention can be instigated to maximise the benefits of CABG.

Some main factors influencing post-CABG recovery, as identified through the literature search, are discussed below and include demographic and psychosocial factors, such as, existing quality of life, anxiety, depression, social support, coping and optimism. The impact of clinical factors (such as prior cardiac surgery, unstable angina and creatine levels, Nashef *et al.*, 1999) is also important but research generally reports their impact on mortality and other clinical outcomes, not their relevance to psychosocial outcomes and thus is beyond the scope of this review, as clinical factors will not be assessed in the research studies presented later in the thesis.

### 3.1 DEMOGRAPHIC FACTORS

#### 3.1.1 GENDER

Much previous research on outcomes of CABG was conducted solely with a male population (Duits *et al.*, 1997). This reflected the majority of patients undergoing the procedure being male at that time. However, recently more women are having CABG surgery (Society of Cardiothoracic Surgeons, 2002) and numerous studies have compared outcomes of men and women.

The issue of gender appears to be complex. Some studies suggest that women experience the same functional and quality of life outcomes as men post-CABG (Duits *et al.*, 1997; King, 2000; Jarvinen *et al.*, 2003), others that women experience smaller gains in these outcomes after surgery compared to men (Bute *et al.*, 2003; Lindquist *et al.*, 2003; Schulz *et al.*, 2005) and have higher readmission rates (Vaccarino *et al.*, 2003; Guru *et al.*, 2006). Other studies suggest that women experience greater improvements in quality of life than men post-CABG but that this reported quality of life is lower than men (Sjoland *et al.*, 1999; Lindquist *et al.*, 2003) and one study reported women experiencing greater mental health gains six and twelve weeks post-CABG than men (Mitchell *et al.*, 2005). Studies generally indicate that there is no gender difference in mortality (Edwards *et al.*, 2005; Guru *et al.*, 2006; Patel *et al.*, 2006) although this has recently been challenged by findings from a US study of national hospital mortality rates indicating that women have higher mortality even when other covariates (including patient demographics, characteristics such as smoking and diabetes, and surgical factors such as number of grafts) were taken into account (Becker and Rahimi, 2006).

Reasons for gender differences have been suggested. Women undergoing CABG are often older than men (Patel *et al.*, 2006), are referred for surgery later than men (Vaccarino *et al.*, 2003) and have more co-morbidities and worse physical functioning pre-surgery (Edwards *et al.*, 2005). It is also reported that women are more likely to report pain and angina symptoms and lower quality of life and mental well-being than men (King, 2000; Lindquist *et al.*, 2003;



Vaccarino *et al.*, 2003). It appears that, although benefiting from CABG, women experience less improvement in quality of life after surgery than men and more research is needed to identify if these gender differences are related to clinical or psychosocial factors.

### 3.1.2 AGE

The age of patients undergoing CABG has increased; in 2001, 23% of patients were over 71 years of age (Society of Cardiothoracic Surgeons, 2002), yet little work has explored the outcome of CABG on differing age groups, including the very elderly (Jarvinen *et al.*, 2003).

The work that does exist suggests that older people are more functionally limited before surgery compared to younger people, but show the same significant improvements in functional capacity (Hedeshian *et al.*, 2002) and quality of life (Jarvinen *et al.*, 2003; Kennedy *et al.*, 2003) post-CABG although the recovery may take longer (Pierson *et al.*, 2003). Other research indicates that elderly people required more post-surgical treatment interventions and had longer hospital stays and higher 30-day mortality (Scott *et al.*, 2005), although one small longitudinal study reported mortality was the same as the age-matched general population (Sjogren and Thulin, 2004). This is an under-researched area, but with the increasing age at which people are undergoing CABG is a potential factor affecting recovery that needs to be considered.

### 3.1.3 OTHER FACTORS

Little evidence is present in the published literature for investigations into the impact of other demographic factors, such as education level and socio-economic status, on recovery. Where such variables have been assessed no evidence for any association between these and recovery has been identified (Lindquist *et al.*, 2003). A recent national US study reported disparity in mortality rates according to ethnicity, but reasons for this could not be explored (Becker and Rahimi, 2006) although it supports a study by Konety *et al.* (2005) who reported black patients had higher mortality than white patients after CABG after adjusting for patient and hospital characteristics. These authors

speculated that black patients may present later when symptoms were worse and surgical risks higher, or that mortality differences may reflect disparities in after-care provision.

## 3.2 PSYCHOSOCIAL FACTORS

Studies investigating poorer recovery after CABG have suggested a multifactorial process affected by numerous contributing psychosocial factors (Duits *et al.*, 1997; Oelofsen *et al.*, 1998) including; depression and anxiety, social support, self-efficacy, self-esteem and coping style.

### 3.2.1 ANXIETY AND DEPRESSION

Some researchers have studied gender differences among patients undergoing CABG and found women more likely to report anxious and depressive symptoms (Duits *et al.*, 1998; McCrone *et al.*, 2001; Hamalainen *et al.*, 2000; Lindquist *et al.*, 2003), although this may reflect socio-cultural norms that inhibit men from revealing the presence of traits perceived as socially unacceptable (Duits *et al.*, 1998).

Studies have identified high anxiety and/or depression as detrimental to post-CABG recovery. American research studies with 100 or more participants have suggested that the presence of pre-operative depression is associated with post-operative mortality from cardiac causes (Peterson *et al.*, 2002; Blumenthal *et al.*, 2003; Burg *et al.*, 2003). There has also been evidence from several international studies to suggest patients with major depression after CABG have longer post-CABG hospital stays (Oxlad *et al.*, 2006), are more likely to experience hospital readmission for cardiac events (Connerney *et al.*, 2001; Oxlad *et al.*, 2006), poorer wound healing (Doering *et al.*, 2005), quality of life (Goyal *et al.*, 2005) and worse emotional and physical recovery (Doering *et al.*, 2005).

The presence of post-operative anxiety has also been shown to be associated with fatigue and disability (Duits *et al.*, 2002) and poorer recovery (Rymaszewska *et al.*, 2003). The poorer satisfaction with life reported by people with anxiety and depression post-CABG was also associated with more

negative views about the value of the surgery, a greater number of health complaints and a less frequent return to work (Rymaszewska *et al.*, 2003).

Current research is unequivocal in identifying a negative relationship between anxiety and/or depression and outcomes after-CABG. Possible reasons to explain this finding include the impact of anxiety and/or depression on lowering adherence to medication, follow-up care and risk factor modification and through direct physiological changes (Connerney *et al.*, 2001; Blumenthal *et al.*, 2003).

### 3.2.2 QUALITY OF LIFE

Quality of life is not only an outcome or indicator of recovery from CABG (see *Section 2.2*) it is also a predictor of various aspects of recovery, which is what will be discussed in this section.

Whilst the majority of studies use quality of life as an outcome measure, a few have investigated if quality of life can predict post-CABG quality of life, physical functioning and length of stay. As expected, quality of life pre-operatively is a good predictor of quality of life post-operatively (Echteld *et al.*, 2003; Muller-Nordhorn *et al.*, 2004; Herlitz *et al.*, 2005) and of recovery (King, 2000). However, Echteld *et al.* note that other variables need to be added to the model to provide a better fit between quality of life pre- and post- operatively.

A large US study reported an association between poorer pre-operative mental health and increased length of hospital stay (Halpin and Barnett, 2005). Other studies have found no association between quality of life score and performance on the six minute walk test (Verill *et al.*, 2003) although Welke *et al.* (2003) found that a high pre-operative score in the mental component subscale of the SF-36 was predictive of better physical health post-CABG, a finding supporting earlier work (Lindsay *et al.*, 2001).

There is limited data on the impact of pre-CABG quality of life on recovery post-surgery, as typically this concept is used as an outcome variable. From the limited data available, it appears that quality of life is multifaceted (Dantas *et al.*, 2002) and is associated with diverse clinical and psychosocial outcomes, which

is unsurprising given that quality of life itself encompasses mental and physical health.

### 3.2.3 SOCIAL SUPPORT

A buffering effect of social support on stress that would result in greater recovery post-CABG has been assumed. However, results of studies testing this hypothesis are mixed and drawing conclusions from findings is hampered by differing definitions of social support (and so the way it is measured), small sample sizes and population differences (Connerney *et al.*, 2001; Hamalainen *et al.*, 2000).

Some findings indicate that patients who report having social support pre-operatively experience fewer symptoms post-operatively (Lindsay *et al.*, 2001), have a better recovery (Duits *et al.*, 1997) and quality of life (Dantas *et al.*, 2002) and better physical functioning (Shen *et al.*, 2004.). However, a large US study of over 1000 patients found that social support was not associated with physical functioning but did have an effect on mental health (Barry *et al.*, 2006). A lack of social support was also found in large US studies to be associated with pre-surgical anxiety (Koivula *et al.*, 2002) and post-CABG depression (Pirraglia *et al.*, 1999). One literature review also suggested that poor social support may predispose people to developing post traumatic stress disorder (Tedstone and Tarrier, 2003).

Social support can be provided by numerous sources. Studies looking at peer support found no effect (for example, Thoits *et al.*, 2000). Although this study was not well-controlled, with other factors, including the timing of the intervention, potentially cancelling out any beneficial effect, a review of the literature suggested it was a valuable area for further study (Colella and King, 2004).

A large US study looked specifically at marital social support and found it associated to length of hospital stay (Kulik and Mahler, 2006). The authors suggested that people without good marital support experienced psychosocial distress about returning home and this manifested in physiological impairments

and thus a slower recovery. However, Hamalainen *et al.* (2000) found, contrary to their expectations, that greater social support was associated with poorer recovery. Rather than indicating that social support is detrimental to recovery, the authors suggest that their findings may indicate those people who are more stressed, as exhibiting signs of stress is likely to increase the support provided by others. Alternatively, those who were recovering well may have required less social support.

Such mixed findings suggest that the person providing support and the timing of such support is important. It may be that the inconclusive findings around the effect of social support reflect wider issues. For example, some social support may be unhelpful – it may, with the best of intentions, encourage sedentary behaviour and thus inhibit the recovery process, or carers may unwittingly push patients into the role of an invalid who is dependant on others, a situation that may cause them anxiety and/or depression. Patients could report having sufficient perceived social support but that may not necessarily correspond to a good recovery after CABG (Hamalainen *et al.*, 2000). It may also be that, although participants had perceived social support, it was not of the type or amount that the participants wanted (Logsdon *et al.*, 1998) and a poor quality of life represents expectations of support not being met. Social support and its impact on recovery may require more in-depth investigation in future to ascertain exactly how it relates to recovery.

#### 3.2.4 COPING

It has been suggested that patients with high coping competence recover better after CABG. Schroder *et al.* (1998) suggested that coping competence acted as a mediator in the relationship between pre-operative resources and post-operative recovery. Later work by Schroder (2004) supported this mediator role of coping between depression and symptoms. Other work has indicated a similar mediation role between optimism and outcome and this will be discussed in the following section (3.2.5).

Some research on specific types of coping styles (Wray *et al.*, 2004) has indicated that problem or acceptance-focused coping is associated with better

perceived physical functioning and less pain post-MIDCAB (minimally invasive direct coronary artery bypass - a similar procedure to OPCABG). Problem-focused coping is also correlated with greater energy, better general health and better recovery a few weeks post-CABG (Khalid and Sial, 1998; Wray *et al.*, 2004). Interestingly, Echteld *et al.* (2003) found that avoidant coping was associated with greater quality of life in patients who had undergone PTCA, an association not found by a later but much smaller study that showed avoidant coping was associated with depression and anxiety (Curtis *et al.*, 2004) nor by slightly larger Australian study that reported an association with poorer self reported health (Oxlad and Wade, 2006). Similarly, an earlier review of the literature (Duits *et al.*, 1997) identified that denial was beneficial in the early post-CABG phase but maladaptive later on in the recovery pathway.

It appears from the research that coping style directs behaviour such that those individuals who employ a more active, problem-focused style make more attempts to recover after surgery and thus report more favourable outcomes than those people who use avoidance styles of coping who may not carry out the mobilising exercises advised by health professionals and thus not report as quick or successful a recovery. Coping style would, therefore, appear to be intrinsically linked with other factors such as optimism, self-efficacy and depression and its influence and mediation effects are complex, needing further research to fully explore how it affects post-CABG recovery.

### 3.2.5 OPTIMISM

Studies investigating the role of dispositional optimism in recovery from CABG are comparatively sparse, and few recent studies have been reported in the literature. A review of early studies by Duits *et al.*, (1997) concluded that optimism, as well as other psychosocial factors, was predictive of post-CABG recovery. Since this review a few small studies have looked specifically at optimism and found supporting evidence for its value in recovery (Scheier *et al.*, 1999; Khalid and Sial, 1998; King *et al.*, 1998; Shen *et al.*, 2004). Although the King *et al.*, study on a comparatively small number of women (n=55) found no association between optimism and functional ability, this may reflect the clinical

differences between men and women undergoing CABG. Frequently women are older, have more co-morbidities and have poorer pre-operative functioning so any improvements in functional ability post-surgery may be less detectable and thus any relationship between functional status and optimism obscured. However, a study by Mahler and Kulik. (2000) on a larger number (n=212) of post-operative CABG patients found pessimism more predictive of positive affect, functional status and pain than optimism, suggesting the notion that the constructs are not at opposite ends of a continuum and may operate in slightly different ways along the recovery pathway (Echteld *et al.*, 2003). It is not yet clear whether optimism or pessimism is the most predictive of recovery after CABG, although research in this field is increasing and further work may aid in differentiating these two constructs.

Researchers have suggested mechanisms by which optimism and pessimism may be linked to recovery, for example, pessimistic people may have preferential processing of negative information, of which there is much prior to CABG, as surgeons are obliged to give patients all the risks of going ahead, or not, with the surgery to enable them to make fully informed consent. In contrast, optimistic people are suggested to make "...more favourable appraisals of their expected success at meeting goals and so are more likely to persist in pursuit of their goals" (Aspinwall and Brunhart, 2000, p165). Most research, including large European, US and Australian studies, suggests that optimism has little direct impact but rather is influential in recovery through its mediating role on coping and self-efficacy (Ben-Zur *et al.*, 2000; Mahler and Kulik, 2000; Echteld *et al.*, 2003; Shen *et al.*, 2004; Bedi and Brown, 2005) whereby optimism promotes active coping, rather than passive/avoidance coping strategies and it is this active coping style that is associated with recovery.

Despite general agreement between researchers on the importance of optimism/pessimism in recovery, more work is needed to fully explore this. For example, there appears to be no work within the CABG literature on whether optimism has different effects between genders, age groups and ethnic groups,

nor whether it alters along the recovery process. It also appears that work is needed to tease out whether it is being optimistic that is important or the active coping is associated with being optimistic that is important to recovery.

#### **4 SUMMARY**

CABG is one revascularisation procedure for treating CHD with the following goals: to provide relief from symptoms of angina, to increase survival, and to improve quality of life. Although its use is decreasing compared to PCI, over 30,000 CABG operations are carried out each year in the UK. Whilst surgery is very effective at meeting the three goals there are a substantial proportion of people who experience a decrease in quality of life following CABG.

In summary, research has identified that although older people do benefit from undergoing CABG, their recovery may be slower, as may that of women, who may also not receive as great a benefit from the procedure as men. A disparity in mortality rates according to ethnic group has been suggested from American studies but whether this is also the case in the UK has not been investigated. Pre-operative anxiety and depression and low quality of life is detrimental to post-operative recovery. Mixed findings surround the impact of social support on recovery; it appears that the type of support and the person/people providing it are important, with the absence of desired support also a factor. Positive determinants of recovery include an active, problem focused coping style and an optimistic attitude, although the latter may facilitate recovery indirectly through its mediating role in coping style and self-efficacy.

Despite existing research, comparatively little is known about the impact of CABG on quality of life (Hedeshian *et al.*, 2002) and there still remains a dearth of information that can help clinicians identify those more likely to experience poorer recovery (Jarvinen *et al.*, 2003) so that interventions can be targeted appropriately. This review identified the need for further work to explore whether demographic differences in recovery reflect biological or psychosocial processes, the reasons for the detrimental impact of anxiety and/or depression,



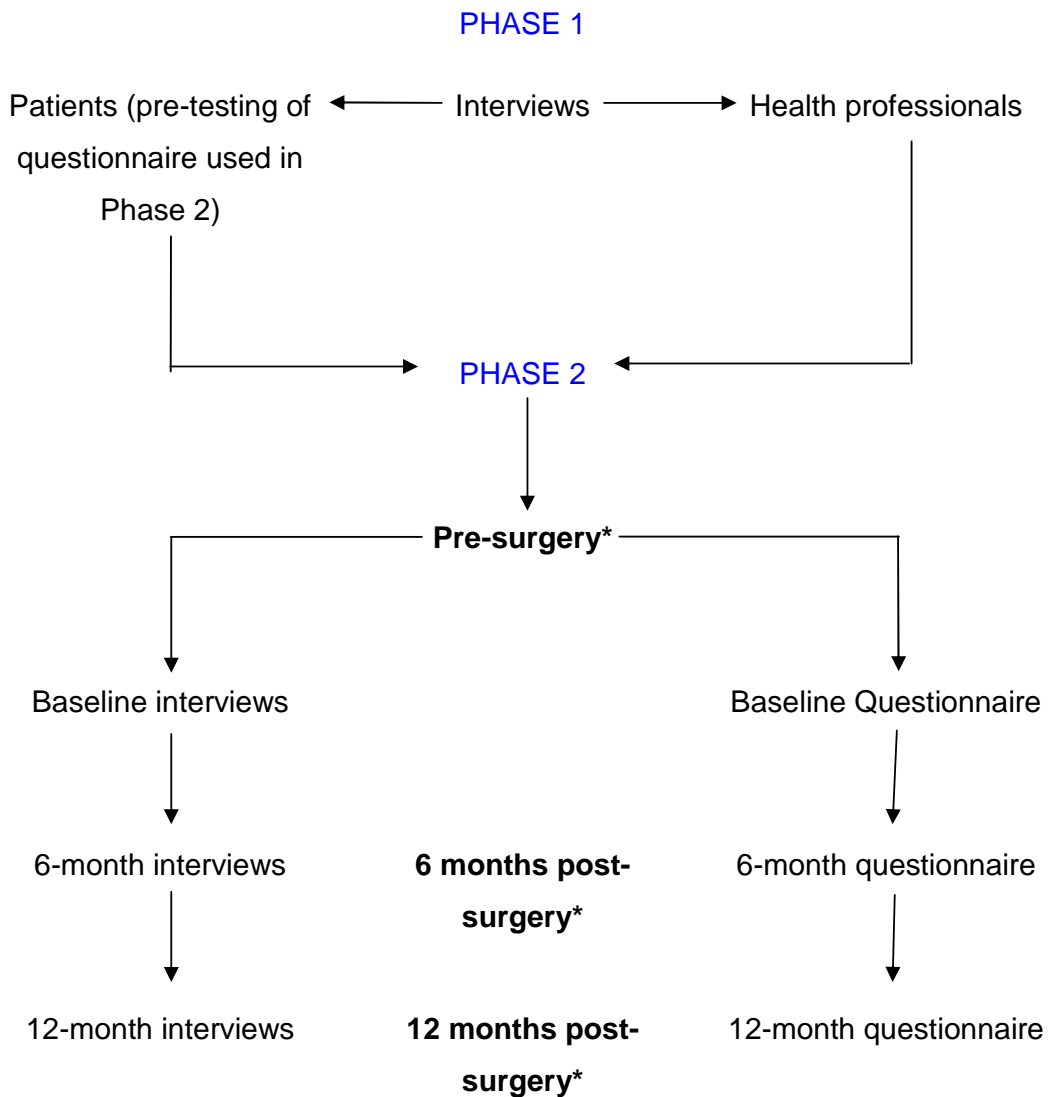
how social support influences recovery, the roles and relationships of optimism, coping and self-efficacy and the reasons for non-attendance at rehabilitation classes.

Additionally, a lack of consensus exists as to the relative contributing importance of various factors. Further research is needed not just into specific issues but also into global recovery to provide a holistic account of recovery and the barriers and facilitators to it. It is important to investigate how all the contributing influences on patient recovery after CABG interact (Duits *et al.*, 1997) and a more in-depth understanding of the impact of these factors on the person, and on their wider family is necessary. Although patient-centred care is a pledge of the UK Government (Department of Health, 2000b) there has been little published research to date that has identified what patients consider recovery to be nor their perceived barriers to recovery after CABG, yet "...no matter how successful the treatment is from the physicians' point of view, the treatment is not successful for the patients unless they perceive it to be so." (Clancy *et al.*, 1984, p174).

## Methodology

This study comprised two phases; the first phase involved interviews with patients who had undergone Coronary Artery Bypass Grafting (CABG) surgery six to twelve months previously and with health professionals experienced in caring for such patients. This provided valuable information on an area that is currently under-researched and fed into the development of Phase 2. The second phase was a prospective longitudinal study using questionnaires and interviews with patients on the waiting list for CABG and following them up until twelve months after surgery. A summary diagram of the methodology can be found in Figure 1.

Figure 1: Summary of the study methodology



\* Components of Phase 2 were not exclusive; participants could take part in interviews as well as the questionnaire.

## 1 MIXED METHODS

This thesis aims to identify and understand the barriers to recovery after CABG; this topic could be approached in several different ways depending on the philosophical standpoint taken. Researchers from a strong realist or positivist

perspective may seek to identify objective, measurable and quantifiable barriers to recovery, such as biochemical or clinical indicators and would, therefore, need to use a particular epistemology to accomplish this. However, taking such an approach denies that there are any person-centred aspects that can influence recovery, as these are subjective and so prone to error and bias. In contrast, a constructivist standpoint considers that removing all subjectivity from our understanding of the world is impossible, as all knowledge, all “reality”, is constructed within social processes; the *person’s perception* of recovery is integral to understanding the barriers to recovery.

Each philosophical standpoint has strengths and weaknesses. Although applying any one perspective can provide an approach to investigating barriers to recovery that will result in a valid understanding, a pragmatist view asserts that a combination of approaches can lead to a fuller consideration of the issues and so to a broader and more complete understanding. Therefore, combining differing methodological approaches that complement each other adds, clarifies, alters and/or consolidates knowledge and understanding. With a pragmatic approach the aim is to use whichever methods will best answer the research question, which can often be a mixed method approach (Tashakkori and Teddlie, 1998). A mixed methods design was used in this research and this approach, triangulation, can add a “sophisticated rigour” (Denzin, 1989, p234) to the research process. Denzin (1989) describes four types of triangulation, to which many other researchers also refer: data, investigator, theory and methodological.

*Data triangulation* considers different sources of information on a particular topic. Asking different groups of people - for example, patients, health professionals and relatives - about their views on a topic provides several sources of data from which to gain a fuller understanding and to shed light on the topic from differing but complementary viewpoints. Additionally, asking these groups of people for their views at different time points adds another layer of information from which a better understanding of the issues can be obtained. A third subtype of data triangulation concerns space – the location of the

research, such as asking both people who are in hospital and those being cared for at home for their views adds to overall understanding.

*Investigator triangulation* refers to the involvement of several researchers in studying a single topic. Each individual will have slightly differing interpretations based on their own subjective experiences and biases. Using more than one person to derive interpretations of findings limits the potential for this subjective bias and so increases the reliability of findings. An example of a common use of investigator triangulation would be inter-rater reliability.

*Theory triangulation* can be difficult to employ as it refers to the assessment of several different theoretical viewpoints at the same time and consideration of the findings in relation to each theoretical stance to see which theory provides the best account or explanation of the data.

The final type of triangulation discussed by Denzin is that of *methodology*. This can refer to using the same research method but in slightly different ways, for example, by using two different questionnaires that measure the same topic, or by using differing methods, such as questionnaires, interviews or observation, to collect data on the same topic. The latter is a stronger type of methodical triangulation as a combination of methods can utilise the strength of one to help overcome the weakness of another.

Although triangulation is often considered to be a way of achieving good validity of the results within any piece of research, it must be noted that researching a topic from slightly differing angles, with the use of differing data sources or methodological approaches, may not lead to one consistent interpretation of the issue under investigation. Triangulation should be used as a way of confirming conclusions and/or of providing a more complete picture of the topic (Arksey and Knight, 1999). As noted earlier, the aim of this research was to obtain a broader, more holistic and patient-centred understanding of barriers to recovery after CABG than has previously been published. As such, any slightly differing interpretations of research findings that emerged aided the development of a more complete picture of recovery.

Various types of triangulation were employed across the two phases of this research study to increase validity of findings. In Phase I, data on barriers to recovery were gathered from both patients retrospectively and health professionals with the use of inter-rater reliability to provide investigator triangulation. In Phase II, patients were interviewed prospectively at different time points along the recovery pathway, providing data triangulation. The data were collected with different methodologies - interviews, questionnaires and cognitive functioning tests - and analysed quantitatively and qualitatively. Qualitative analysis has the strength of greater validity than quantitative analysis, while the latter has greater reliability of findings (Greenhalgh, 2001).

## **2 QUALITATIVE METHODOLOGY**

Qualitative data used to be seen as of less value than quantitative data; this has now changed and the majority of researchers accept the benefit of qualitative research and analysis (Greenhalgh, 2001; Flick, 2002). Qualitative data can be gathered in numerous ways, for example, by observation, interviews, focus groups and diaries (Greenhalgh, 2001).

Interviews and focus groups often produce similar data but the dynamics can be very different. Both situations have issues to consider in terms of the interaction between the researcher and the participant. Within the interview setting, as in every social situation, there is the potential for the participant to attempt to portray a particular self-image, possibly the image they perceive is most acceptable to the researcher (Wilkinson *et al.*, 2004). To minimise this it is essential that the researcher create a non-judgemental atmosphere where participants feel able to make any comments they wish and that their views are important to and valued by the researcher (Wilkinson *et al.*, 2004). With focus group data collection this issue of self-image presentation is compounded by the influence and impact of other members of the group, some of whom may be vociferous and inhibit quieter members of the group from responding freely or who may dominate a conversation towards their own agenda, rather than allowing the group as a whole to shape the discussion. The researcher

facilitating the focus group needs considerable experience of conducting such groups to be able to manage all elements successfully.

Whether it is most appropriate to conduct focus groups or individual interviews depends on several considerations. These include: practical matters, such as the time available and the logistics of conducting numerous interviews as opposed to arranging a few focus groups, the nature of the topic to be discussed where some are distressing or highly sensitive and, therefore, inappropriate to discuss within a group setting, and the participants involved as some people may be more confident than others about discussing certain issues within a group. The interaction between participants may be one of the aspects to be analysed depending on the research aims; alternatively the ability to pursue topics of interest that arise may be easier in an individual setting than in a group.

Individual interviews were considered most appropriate for this research for several reasons, primarily due to the potentially sensitive nature of the topic under discussion. It was felt that some individuals might be uncomfortable talking about their experiences of recovery after surgery within a focus group. Additionally, individuals would be approached for interviews at particular stages of their recovery so there were potential logistic difficulties with conducting a focus group with sufficient participants all at the same stage of recovery.

Having determined that interviews would be used, the format of the interview schedule was also considered. In a semi-structured interview format, participants are all asked the same basic questions but there is an opportunity for participants to raise their own issues and to take the discussion into a different direction from that originally planned by the researcher. In this way, all participants were asked for their views on particular issues but the flexibility to follow up interesting and new issues is included. With structured interviews, each participant is asked exactly the same questions in the same order with no deviations from the interview schedule, so preventing the interviewer from pursuing other lines of discussion. This method has its merits but is typically used to administer questionnaires or short answer questions where time to

conduct interviews and analyse findings is limited. As participants' views on certain topics are wanted in this study, a semi-structured interview, as opposed to an in-depth or ethnographic interview, where just a couple of topics are covered in great depth, is most appropriate to the research aims.

There are many different approaches to analysing qualitative analysis that reflect the differing theoretical stances. Selecting the method of analysis for the data gathered is largely a matter of identifying the most appropriate methodology for the type of data and aims of the research. Content or thematic analyses are usually more appropriate to research aims that are more exploratory in nature, whereas research seeking more in-depth information is likely to utilise discursive, interpretive or phenomenological analyses.

The two methods of analysis used in this research will be detailed below.

## **2.1 THEMATIC ANALYSIS**

The essential elements of content or thematic analysis are very similar and are described by Joffe and Yardley (2004). Briefly the process is as follows:

- Data familiarisation: reading of complete interview transcripts
- Data reduction: coding of the interview transcripts and field notes
- Interpretation: understanding the meaning of concepts and categories generated.

Both approaches result in data reduction, thus making this a much-used approach within exploratory research. With both content and thematic analysis, the data is reduced into categories or themes that have been derived from a theoretical model or set of assumptions that are imposed onto the data, although the opportunity for inductive analysis based on themes occurring within the data also exists. The aim of content or thematic analysis is not to gain an in-depth understanding of a particular narrative but rather to understand the meanings many participants attach to a particular theme or category (Joffe and Yardley, 2004).



Content and thematic analysis have much value within research but can be limiting in that data are reduced and paraphrased to the extent where some of the intricacies of meaning may be lost. However, thematic and content analyses also require that the bulk of the data are described, including themes that occur rarely and those which seem to contradict other themes within the source data. In this way, although data are reduced, the meanings are still present in the final analysis, albeit without the nuances that it may be possible to derive when utilising more in-depth methods of analysis, such as discourse analysis.

Although thematic analysis is very similar to content analysis, there are slight differences. It is possible with content analysis to generate quantitative data by counting the instances that each category or theme is mentioned. This can provide an indicator of how important each category is to the participants. However, mentioning an issue several times does not necessarily mean that it is more important to that participant. It may instead reflect, for example, that the issue is difficult to convey and is mentioned more often as the participant attempts to describe it to the researcher. If quantification of interview data is required then a different research methodology may be more appropriate, for example the use of a nominal group technique. With thematic analysis an indication of the frequency with which topics are mentioned can be derived, but the context in which they occur is given consideration, so enabling a more accurate representation of the relative importance of differing themes to each participant (Joffe and Yardley, 2004).

## **2.2 FRAMEWORK ANALYSIS**

Framework analysis is similar to content and thematic analysis and is appropriate for research that aims to uncover patients' attitudes towards certain aspects of their health or healthcare as it gives scope for the identification of certain types of individuals or groups with similar attitudes or the comparison of views across groups. This approach has been described by Ritchie and Spencer (1994) and Pope *et al.*, (2000) and is broadly as follows:

- Data familiarisation: reading of complete interview transcripts, listening to original audio-recordings and use of field notes
- Identifying a thematic framework: key issues, concepts and themes are identified and an index of codes developed
- Indexing: whereby the index generated through identification of the thematic framework is applied to all data
- Charting: a summary of each passage of text is transferred into a chart to allow more overall and abstract consideration of index codes across the data set and by each individual
- Mapping and interpretation: understanding the meaning of key themes, dimensions and broad overall picture of the data and identifying and understanding the typical associations between themes and dimensions.

The charting process provides an opportunity to code data from numerous vantage points, by demographic factors, such as gender or age, by personality characteristics, such as looking specifically at people who are highly anxious compared to those who are not, or by medical aspects, such as those with diabetes compared to those without.

Although published research using framework analysis is sparse, in the past couple of years an increasing number of studies have employed this method of analysis (e.g., Carlisle *et al.*, 2006; Nolan, 2006; Richards *et al.*, 2006). Studies have used this type of analysis to investigate experiences of seeking treatment for oral cancer (Scott *et al.*, 2006) and varicose veins (Palfreyman *et al.*, 2004), cancer treatment expectations (Llewellyn *et al.*, 2005), impact of Pap test results (Kahn *et al.*, 2005) and barriers to accessing cardiac rehabilitation services (Tod *et al.*, 2002).

This type of qualitative methodology is appropriate for the research aims of this thesis as it allows the opportunity for the broad area of recovery after bypass to be considered whilst identifying key contributing themes within that area. It also

gives scope for the identification of certain types of individuals who may experience particular barriers to recovery or certain circumstances often linked to poorer recovery.

### **2.3 SAMPLE SIZE**

Unlike quantitative studies, where calculations of the sample size needed to achieve a specified level of statistical power can be made, no such formal calculations are used in qualitative studies. Qualitative studies typically involve far fewer participants than quantitative studies (Arksey and Knight, 1999). The type of qualitative analysis described above would be impractically time-consuming for the large numbers of participants needed for quantitative rigour. More importantly, the large amounts of data would be too difficult to analyse with respect to patterns of findings and participants and relationships between them and would, consequently, produce only summary findings rather than the greater detail qualitative methodologies are designed to uncover (Yardley, 2000).

Instead, it is often preferable in qualitative research to use purposive sampling, where people are specifically chosen for particular reasons or their “special attributes” (Yardley, 2000, p218), such as people who are highly anxious or people who are not at all anxious. In this way, participants who are representative of the population under study can be recruited and so give validity to the research findings (Arksey and Knight, 1999).

A definitive guide to the number of participants needed for qualitative work does not exist. Some types of qualitative analysis, such as grounded theory, require recruitment to continue until saturation of findings emerging from the data is achieved, (i.e., until participants raise no new themes) and, consequently, conducting further interviews would not add any greater insight to the topic under investigation. However, as a general rule of thumb, 10-12 participants are typically considered an appropriate number for most qualitative studies where content or thematic analysis will be applied to the data.

For Phase I interviews it was necessary to gather views from both men and women with a broad age range to ensure that any differences in recovery across the genders and the age span are represented.

## 2.4 RELIABILITY AND VALIDITY

Ensuring reliability and validity of qualitative data is not as straightforward as with quantitative data but is possible, although still a topic of debate (Flick, 2002). One technique suggested by Lincoln and Guba (1985) refers to ensuring the “trustworthiness” of the research by considering the issues of credibility, transferability, dependability and conformability of findings. Using these criteria, qualitative research can be conducted that provides data that is as trustworthy as possible, given the inherent biases of participant selection in any opt-in research project. More recently, Greenhalgh (2001) has summarised past publications to present a set of questions that can be applied when considering qualitative research. These questions are similar in essence to the existing criteria of good qualitative research collated by Yardley (2000). These four criteria are summarised by Yardley as: sensitivity to context, commitment and rigour, transparency and coherence, and impact and importance.

Under the criterion of *sensitivity to context* Yardley refers to conducting qualitative research within the context of existing published work and theoretical models. The interpretations must be evident from the data itself and based on participant perspectives.

Meeting the criterion of *commitment and rigour* involves “prolonged engagement with the topic... development of competence and skill in the methods used, and immersion in the relevant data” (Yardley, 2000, p221). Thoroughness of data collection and analysis is also important; ensuring that all data are considered, not just that which supports the researcher’s views or their main interpretation, and perhaps involving the use of triangulation of data collection methods or analysis to provide a broader understanding of the topic. It is possible with some types of qualitative analysis (e.g., content or thematic analysis) to assess inter-rater reliability. A second rater is asked to code a sub-

sample of the data using the codes already developed by the first rater. If there is a high agreement of coding between the two raters, the codes applied to the data are considered to be reliable.

*Transparency and coherence* of methods and analysis is also required for good qualitative research: the ability for others to follow the path of data collection, analysis and interpretation. Reflexivity is also necessary here, to consider how the research process and the attributes of the researcher may affect the data collected and its subsequent analysis. The final criterion of *impact and importance* reflects the value of the work, whether it aids understanding and/or has practical benefits for participants, health care professionals, policy makers and so on.

## 2.5 ETHICAL ISSUES

Qualitative research raises some specific ethical questions. It has been mentioned earlier in this chapter that discussing potentially sensitive topics can become distressing to some participants and these may be more suitable for discussion within a one-to-one interview setting as opposed to a focus group. Ethical committees approve particular interview schedules for use within a study and researchers should not deviate from these previously approved areas of discussion (Wilkinson *et al.*, 2004). The research reported here was designed to ensure minimal distress to participants. However, it is important that, should participants become distressed during the interview, they receive good care. Therefore, a plan of how to support participants should that situation occur was developed alongside the study design using the research team's past experience and published advice (for example, Wilkinson *et al.*, 2004). In addition, a plan of ensuring researcher safety was also developed, given that some interviews might take place in participants' homes.

An often-neglected ethical issue for qualitative research is that of maintaining participant confidentiality. The requirements of the Data Protection Act (1998) refer only to storage and access to data. However, publication of any part of the interview, illustrative quotations, for example, might inadvertently identify the

participant to health professionals, family and friends. In these circumstances, sections of text must either be omitted from any reports or publications or details changed to prevent identification of the participant (Morse, 1998).

### 3 QUESTIONNAIRE SURVEY

Postal surveys are a useful, cost-effective way of gathering the views of a large number of people (Dillman, 1991). However, non-response to postal surveys can bias the findings (Etter and Perneger, 1997), as it may be that the people who do not respond are different in some way from those who do respond, which has implications for the validity of the data. Whilst this type of bias is impossible to remove completely, some studies have investigated methods of increasing response. A recent large systematic review (Edwards *et al.*, 2002) identified several methods that can increase responses, the most effective of which were enclosing a monetary incentive and sending the questionnaire by recorded delivery. These methods were impractical within this thesis due to the budget constraints (the cost of sending each questionnaire by Special Delivery, the only equivalent method now offered by Royal Mail would be £3.85 per item in addition to normal postage rates). However, a later study in the US found no difference in response rate of health professionals to questionnaires sent by first-class post compared to by Federal Express (Doody *et al.*, 2003) while Edwards *et al.* (2002) found that sending by first class post (compared to second class) also increased response rate.

The systematic review also identified several other methods of increasing response that were incorporated into the design of this study namely, personalising the letters, enclosing a stamped return envelope and following up non-responders with a second copy of the questionnaire. Edwards *et al.* also found that questionnaires of interest to participants were more likely to be returned, as were those sent from a University, and those that were short. The only aspect found to decrease response rate was questionnaires covering sensitive topics. The questionnaire in this study was kept as short as possible to minimise the burden of completion on participants and, although the

questions were pertinent to the participants, it may be that some participants felt they were on a sensitive topic.

### **3.1 PARTICIPANTS**

Only patients undergoing elective, first-time isolated CABG were approached to take part in this study. Although some patients undergo simultaneous CABG and valve surgery these patients were excluded from the study as they are a clinically different population. Patients needing valve surgery have often been aware of the problem for some years and have a shorter life expectancy if they do not undergo valve surgery once symptoms appear. Patients undergoing any type of valve surgery often have to take warfarin for the rest of their lives to prevent blood clots forming around mechanical valves and must be very careful to ensure that the valves do not get infected. Many patients needing isolated CABG have had a myocardial infarction at some point prior to surgery, which is less commonly experienced by patients having valve surgery. Patients undergoing combined CABG and valve replacement or repair have a higher mortality rate of around 8% (Society of Cardiothoracic Surgeons, 2002) and a slightly longer hospital stay than those undergoing isolated CABG. These clinical differences between patients presenting for valve and CABG and for isolated CABG may lead to psychological differences between the two populations.

CABG is a successful procedure but around five to ten percent of patients require further bypass or revascularisation in the future (BHF, 2001). These patients were also excluded from this study, as they too may be psychologically different from patients having first-time CABG given their knowledge about the procedure and what to expect post-surgery. Such redo CABG also conveys higher mortality risks of around eight percent and a slightly longer hospital stay (Society of Cardiothoracic Surgeons, 2002). The decision to include only those having elective procedures in this study was made for two reasons: firstly, patients needing emergency surgery may have had little or no time to prepare for surgery and had little information about the procedure, risks or benefits. Secondly, in practical terms it would also have been extremely difficult to recruit

patients prior to surgery, which would have made it virtually impossible to develop a model to predict recovery for this group of patients.

Other studies have excluded patients having combined CABG and valve surgery (such as Hamalainen *et al.*, 2000; Penckofer *et al.*, 2005), those having emergency surgery (including Lindsay *et al.*, 2001; Falcoz *et al.*, 2003) and those having redo CABG (for instance, Ben-Zur *et al.*, 2000; Koivula *et al.*, 2002). No translation or interpreting services were made available to patients. This was due to cost implications and the difficulties of ensuring semantically equivalent materials for all patients. Many other studies also excluded participants for this reason (for example, Connerney *et al.*, 2001; DiMattio and Tulman, 2003). Although there may be some differences in clinical outcomes following OPCABG compared to conventional CABG, recent studies have suggested there is no difference in health-related quality of life (Puskas *et al.*, 2004) and thus no comparisons were made between these two procedures in this study.

### 3.1.1 SAMPLE SIZE

Past research studies provided a useful indication of likely response rates and of drop-out and death rates over the course of this longitudinal study. However, few published studies exist that use a similar design to that in this study; the majority used a structured interview technique (e.g., Jaarsma *et al.*, 1997; Kattainen *et al.*, 2004) and/or followed patients up to six months post-operatively, or gave patients the initial questionnaire after admission for surgery (Jarvinen *et al.*, 2003). Of those that use a prospective, postal survey design over twelve months the percentage that declined to take part was not indicated. These studies often report the drop-out rate, which for twelve-month follow-up studies varied between 2.4% (Falcoz *et al.*, 2003) and 6.2% in a UK study (Lindsay *et al.*, 2000a). Additionally, an aspect to consider for longitudinal studies is the death rate. The average national mortality rate 30 days after elective, isolated, first time CABG is two to three percent (Society of Cardiothoracic Surgeons, 2002) with more recently gathered figures giving a



rate of two percent for University Hospital Coventry, one centre taking part in this study, (Patel, 2001). None of the published studies consulted indicated a proportion of patients who subsequently declined surgery after having been placed on the surgical waiting list.

## **3.2 MEASURES AND SCALES**

The selection of the various measures within the questionnaire is discussed below. It was decided, where possible, to use existing validated measures and ideally those which had been used before in UK studies with patients undergoing CABG with no reported difficulties. However, as this study was for a PhD the financial costs of using some of these were prohibitive and alternatives were chosen.

### **3.2.1 QUALITY OF LIFE**

The main outcome for this study, as in many others, is perceived quality of life post-surgery. A vast array of measures to assess quality of life exists, some generic, some designed specifically for use with people with particular illnesses or in certain situations, such as after a myocardial infarction (MI). One specific measure designed for use after coronary revascularisation procedures such as angioplasty and CABG is the Coronary Revascularisation Outcome Questionnaire (Schroter and Lamping, 2004). This is a new scale with validation data presented by the authors for a three-month follow-up post-procedure, although the authors comment that the scale is also suitable nine months post-procedure. It appears to be a promising tool; however, the recent development of the scale means, at the time this study was devised, little data existed and none covered its use in twelve-month follow-up studies (the time-frame used in this study) has been presented. Validation of the tool is outside the scope of this study and, therefore, it was decided to use a measure with well-established validity and reliability.

With no other specific validated tools to assess quality of life after CABG it was decided to use a generic measure for this study. This would also enable the

potential for comparison of data from this study with that looking at patients undergoing different surgical procedures or other illnesses (Johnansson *et al.*, 2004). Looking at past research in this area two measures have most commonly been used: the Short Form – 36 Health Survey (SF36, Ware *et al.*, 1993; Ware *et al.*, 2000) and the Nottingham Health Profile (NHP, Hunt and McEwen, 1980). The NHP has dichotomous responses to questions covering physical mobility, pain, physical isolation, emotional reactions, energy and sleep. In 2002, Klevsgard *et al.* compared the NHP and SF36 in patients with lower limb ischemia and found the SF36 to be less skewed and more homogeneously distributed, although the NHP was better at detecting changes in patients over the one-month time frame in their study. A study in the same year (Falcoz *et al.*, 2002) comparing both questionnaires with patients after cardiac surgery suggested that the SF36 was more suitable and, conversely to Klevsgard *et al.*, more sensitive to change over a five-week period. Therefore, it was decided to use the SF36 for this study. A large number of studies (including those with UK populations) have used the SF36 with patients undergoing CABG with no reported difficulties (for example, Lindsay *et al.*, 2000a; Lindsay *et al.*, 2001; Bapat *et al.*, 2005).

#### *Medical Outcome Study 36-item Short Form Health Survey (SF36v2)*

The SF36 comprises 36 questions that can be grouped into eight sub-scales: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health, together with one question on change in health status over the past year. The eight subscales can also be combined to produce two overarching summary measures for physical (physical component summary score, PCS) and mental health (mental health component summary score, MCS). Scoring is such that a high score indicates better physical functioning, role-physical functioning, general health, social functioning, role-emotional functioning, mental health, more vitality and a lack of bodily pain. A revised version (SF-36v2) was found to have better reliability in a UK population (Jenkinson *et al.*, 1999) and was used in this study.

Normative data for version 2 from a UK general population (Jenkinson *et al.*, 1999) gives a mean MCS of 51.16 (standard deviation, S.D., 9.34) for men and 49.17 (S.D. 10.39) for women and a mean PCS of 50.63 (S.D. 9.41) for men and 49.54 (S.D.10.40) for women. This version has a Cronbach's alpha of between .80 and .95 across the eight subscales.

### 3.2.2 ANXIETY/DEPRESSION

Previous research measuring anxiety/depression in cardiac patients varies greatly as to which scales are used depending on the aims and research questions. Where the aim is specifically to assess anxiety and depression separately, typically the Centre for Epidemiologic Studies Depression Scale (Radloff, 1977) or Beck Depression Inventory (BDI, Beck *et al.*, 1961) and State-Trait Anxiety Inventory (STAI, Spielberger *et al.*, 1983) are used (e.g., Tsushima *et al.*, 2005; Bute *et al.*, 2003; Rymaszewska *et al.*, 2003). However, much published research uses the Hospital Anxiety and Depression Scale (HADS, Zigmond and Snaith, 1983) or the General Health Questionnaire-12 (GHQ12; Goldberg and Williams, 1988), both of which assess anxiety and depression within the same questionnaire. There has been some debate as to which of these two measures is most appropriate to use with patients who are physically ill. There is growing evidence indicating that the HADS is more appropriate for use with cardiac patients, as scores are not affected by symptoms of physical illness unlike the GHQ-12, which incorporates items that specifically ask about physical complaints and which may, therefore, incorrectly attribute distress to people who are actually reporting somatic symptoms of a physical illness (LeFevre *et al.*, 1999). It has been recommended by Fossa and Dahl (2002) that the HADS should be used in addition to the SF36 and that the subscales should be assessed separately, which was done in a recent UK study with patients undergoing CABG (Wray *et al.*, 2004). Other research using the HADS with this group of patients include European studies by Duits *et al.*, 1998; Duits *et al.*, 2002 and Koivula *et al.*, 2002. A UK study of patients undergoing MIDCAB (Wray *et al.*, 2004) also used the HADS as one of their measures, as

did a UK study with patients attending cardiac rehabilitation (Turner *et al.*, 2003), which found the scale had acceptable sensitivity and specificity.

### *Hospital Anxiety and Depression Scale (HADS)*

The HADS takes around five to ten minutes to complete and comprises fourteen items with seven combining to produce the depression scale and seven making up the anxiety scale. All questions on the HADS are scored from 0-3 with higher scores indicating greater depression/anxiety or distress. The authors give a cut off total score of 11 on each scale to indicate probable clinical disorder. A recent UK study (Ellard *et al.*, 2006) using HADS with patients undergoing CABG found moderate correlations between depression and positive and negative affect and a high correlation between anxiety and negative affect. The HADS has good reliability for individual anxiety and depression scales and for the combined scale with a UK general population sample (Cronbach's alphas of .82, .77 and .86 respectively) and a moderate and significant correlation of .53 between the anxiety and depression scales (Crawford *et al.*, 2001).

A UK study (Crawford *et al.*, 2001) assessing general population norms found a mean anxiety score of 6.14 (S.D. 3.76) with 12.6% scoring above 11 and a mean depression score of 3.68 (S.D. 3.07) with 3.6% scoring above 11. Pre-CABG patients in a UK study (Ellard *et al.*, 2006) had a mean anxiety score of 9.71 (S.D. 4.77), mean depression score of 5.45 (S.D. 3.57) with a six-week post-CABG mean anxiety score of 5.01 (S.D. 2.94) and mean depression score of 3.52 (S.D. 3.05).

### 3.2.3 MOOD

There are two scales measuring mood that are most commonly used with patients undergoing CABG reported in the research literature. A few researchers (such as de Klerk *et al.*, 2004; King *et al.*, 1992) have used the Profiles Of Mood States (POMS; McNair *et al.*, 1971) but most typically utilised

(for example by Mahler and Kulik, 2000; Echteld *et al.*, 2003; Hermele *et al.*, 2007) is the Positive and Negative Affectivity Schedule (Watson *et al.*, 1988).

#### *Positive and Negative Affectivity Schedule (PANAS)*

PANAS is a short tool, taking around five minutes to complete, which asks participants to indicate to what extent they have felt each of the twenty listed emotions during a particular time frame. Examples of the ten positive affect (PA) items include “interested”, “excited” and “alert”, the words “distressed”, “upset” and “scared” are included in the list of ten negative affect (NA) items. It has adequate test-retest reliability of between .39 and .71 over an eight week period, a Cronbach’s alpha of between .74 and .90, and showed a small correlation between PA and NA items (Watson *et al.*, 1988). NA is moderately correlated and PA slightly correlated with the BDI and STAI (Watson *et al.*, 1988). Some validation research has been done on a shorter 10-item version (Mackinnon *et al.*, 1999) but concluded that although this shortened version could be used it would benefit from slight amendments to the listed emotions. For this reason it was considered better to use the full twenty-item version as the slight increase in completion time for this version would be minimal.

PANAS items are scored between 1 (very slightly/not at all) and 5 (extremely) and added to give a total for the PA and NA scales with higher scores indicating higher positive/negative affect. The authors report that psychiatric patients scored significantly higher on negative affect and lower on positive affect than the general population (Watson *et al.*, 1988). A recent UK study (Ellard *et al.*, 2006) reported a pre-CABG mean PA score of 29.29 (S.D. 6.97) and mean NA score of 22.48 (S.D. 9.10) and six weeks post-CABG mean PA score of 31.15 (S.D. 7.26) and mean NA score of 16.41 (S.D. 5.90). This study showed that NA was highly correlated with the perceived stress scale (PSS) and anxiety (measured using the HADS) but neither was so highly correlated as to indicate multicollinearity - i.e., the scales were not measuring the same construct – and that PA and NA were moderately correlated with depression (measured with the HADS). Moderate correlations between the NA subscale and quality of life (using the Mac New Heart Disease Quality of Life questionnaire) were found at

admission and at one and six months post CABG in a recent Greek study (Panagopoulou *et al.*, 2006). Small correlations were also found in other research between the Life Orientation Test and both affect scales (Bedi and Brown, 2005).

### 3.2.4 OPTIMISM

Although there are other scales that assess optimism, studies published in the literature looking at the effect of an optimistic personality on recovery after CABG (including King *et al.*, 1998; Scheier *et al.*, 1999; Ben-Zur *et al.*, 2000; Mahler and Kulik, 2000) have predominantly used the Life Orientation Test (LOT, Scheier and Carver, 1985) and so it was decided to use the more recent, revised version of this scale in this research.

#### *Life Orientation Test (LOT)*

A revised, validated version of the LOT (LOT-R, Scheier *et al.*, 1994) has been published, and contains just ten items (rather than the 12 items comprising the original LOT), four of which are not scored. Three of the scored items are reverse coded before scoring (from 0-4) with higher scores indicating greater optimism. Examples of questions included in the LOT-R are “I’m always optimistic about my future” and “I hardly ever expect things to go my way”. Data indicates that the LOT-R is stable over time, with a test-retest reliability of .60 at twelve months and has acceptable reliability (Cronbach’s alpha of .78). It has moderate correlations with the trait version of the STAI, neuroticism from the Eysenck Personality Questionnaire, the Rosenberg’s self-esteem scale (Scheier *et al.*, 1994) and the BDI (Shen *et al.*, 2002). Low to moderate correlations were identified between PA and NA and the SF36 (Beckie *et al.*, 2001) and social support (Bedi and Brown, 2005).

Norms for the LOT-R with 159 patients awaiting CABG provided by Scheier *et al.* (1994) give a mean score of 15.16, S.D. 4.05 (14.92, S.D. 3.97 for women and 15.24, S.D. 4.09 for men).

### 3.2.5 SOCIAL SUPPORT

King (2000; King *et al.*, 2001) used the shortened Social Support Scale (Funch *et al.*, 1986) in her studies on recovery after CABG. This is a short scale of just five items, although other studies looking at the impact of social support on recovery after CABG devised their own questions or used a measure of social activities to indicate the amount and type of support the patient feels is available to them (e.g., Hamalainen *et al.*, 2000; Lindsay *et al.*, 2001). Longer measures of social support can reveal a person's social support network, however, single item questions can be highly predictive of health status (Bowling, 1991). In this study, the nature of the social support is not under investigation; rather the effect on quality of life of the perceived availability of such support is of interest. Therefore, a lengthy questionnaire was not necessary; a single question was sufficient for the aims of this study and helped to keep the length of the questionnaire to the minimum to maximise participation. To this end, the most suitable is the COOP/WONCA social support chart (Nelson *et al.*, 1987). Although not often used in research with patients undergoing CABG, the COOP/WONCA charts have been much used within primary care and in a recent UK study of patients taking part in cardiac rehabilitation (Turner *et al.*, 2003), which reported the charts were easy for participants to use.

#### *COOP/WONCA charts*

The COOP/WONCA charts comprise nine charts, each on a different domain with pictorial and written descriptions of the five response options. Higher scores indicate poorer perceived social support. Only the social support chart was used here as the domains covered within the other charts were measured in the other scales already included in the questionnaires. The charts have adequate test-retest reliability of .67 over a two week period with patients being seen in US primary care and outpatient clinics (Nelson *et al.*, 1990). Validity assessment was good with the appropriate charts having significant and high correlations (of between .59 and .69) with scales on the RAND general health status measures (Nelson *et al.*, 1990) and have been validated with people with

chronic obstructive pulmonary disease (Stavem and Jodalen, 2002) and used with a UK sample of cardiac rehabilitation patients (Turner *et al.*, 2003).

### 3.2.6 PERCEIVED STRESS

The extent to which people feel stressed is a vital aspect when assessing recovery after a major stressful event such as heart surgery. Although psychological stress has not often been assessed in past studies with patients undergoing CABG, using such a measure would provide an indication of the extent to which patients feel under stress and this can be related to their recovery. Few validated measures of stress exist with Echteld *et al.* (2003) devising their own questions to measure stress perception. As it had been decided, as far as possible, to use previously validated tools in this study, and ideally those that had been used before with this study's participant population with no reported difficulties, the Perceived Stress Scale (PSS, Cohen *et al.*, 1983) was chosen. This was used recently with patients undergoing CABG (Ellard *et al.*, 2006) and comparative data on mean scores for UK patients undergoing CABG were available.

#### *Perceived Stress Scale (PSS)*

The PSS asks participants to indicate how often during the past few weeks they have felt a particular way, providing a score of their perceived stress level. Questions include; "In the last month, how often have you been upset because of something that happened unexpectedly?" and "In the last month, how often have you felt nervous and 'stressed'?" The scale takes five to ten minutes to complete with higher scores indicative of greater perceived stress. Although there is a high correlation between the PSS and the CES-D (Cohen *et al.*, 1983), assessment by the authors of the partial correlations indicated that, although they overlap, the scales were independent. Correlations with the Life Event Scale (Levine and Perkins, 1980) provide evidence of the validity of the PSS and the scale has adequate test re-test and internal reliability. A recent study using the PSS (Ellard *et al.*, 2006) showed high correlations with anxiety



and depression (measured using HADS) and negative affect (using PANAS) but not so high as to indicate multicollinearity.

A number of versions are available comprising fourteen, ten or four items, all of which have been validated (Cohen and Williamson, 1988). Further research by the initial developers of the scale found that the ten-item version of the scale had slightly better internal reliability than the longer fourteen-item version and concluded "...we recommend use of the PSS10 in future research." (Cohen and Williamson, 1988 p61). Therefore, the ten-item scale will be used in this study. The PSS 10 has good reliability (Cronbach's alpha of .85 on average) and a test-retest reliability of .85 over 2 days and of .55 over 6 weeks (Cohen *et al.*, 1983). Mean score for the general population is 13.02 (S.D. 6.35) with women scoring slightly higher than men (men: mean=12.1, S.D. 5.9; women: mean 13.7. S.D. 6.6), and people over 55 scoring lower than the general population. A recent study of UK patients undergoing CABG (Ellard *et al.*, 2006) reported a pre-surgery mean PSS score of 15.90 (S.D. 7.48) and a six weeks post-surgery mean score of 11.73 (S.D. 5.89).

### 3.2.7 ADDITIONAL QUESTIONS

In addition to the validated measures described above, several other questions were included in the questionnaire. These were as follows:

#### *Demographic*

Gender, marital status, date of birth, education level and ethnicity (the latter items not always available to the researcher) were included on the questionnaire.

#### *Self-efficacy*

Although there is a recently developed measure specific for patients undergoing CABG (Barnason *et al.*, 2002), this measure comprises fifteen items so it was felt more appropriate to develop a shorter measure to ensure the questionnaire was kept to an acceptable length for participants. Using similar wording to that

used by Elizur and Hirsh (1999) a single question asked participants to indicate how confident they felt in managing their heart condition. This method follows that recommended by Bandura (1986).

#### *Recovery and rehabilitation*

On the six- and twelve-month follow-up questionnaires, items relating to perceived recovery were included, as was a question ascertaining whether the patient had attended a rehabilitation course and whether participants felt surgery had been worthwhile. The question of rehabilitation class attendance reflected the wording of a question on the same topic in the coronary heart disease survey of patients 2004 (Healthcare Commission, 2005). Response options for questions on perceived recovery and whether surgery was worthwhile were phrased to match wording on questions in the NHS patient surveys (for example, Healthcare Commission, 2005b) as these questions have been extensively tested with patient populations with no reported problems.

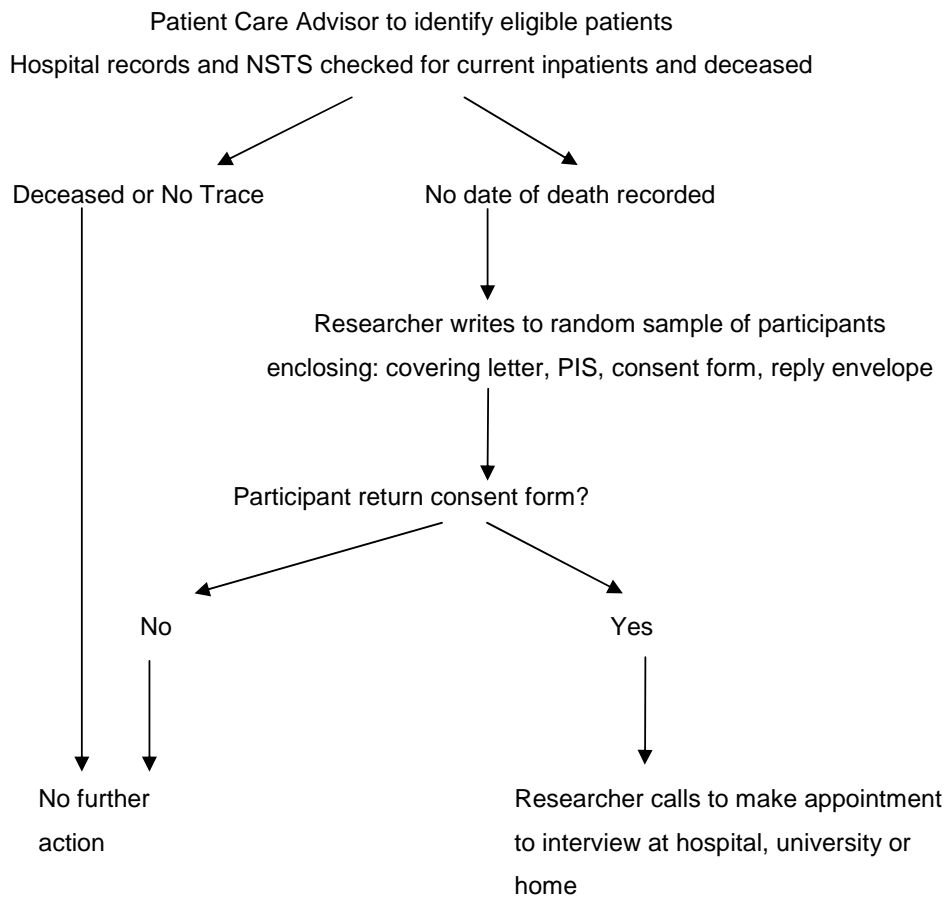
## 4 PARTICIPANT RECRUITMENT

### 4.1 PHASE 1

#### *Patients*

Please see Figure 2 for a summary of the Phase I patient recruitment.

*Figure 2: Flow chart of Phase I patient interviews procedure*



For this part of the study, the Patient Care Advisor (PCA, co-ordinates the surgical waiting list and patient choice initiative) identified a sample of patients who were over eighteen years of age, were able to comprehend English sufficiently to give fully informed consent and participate in an interview and had undergone an elective, first-time, isolated CABG at University Hospitals Coventry and Warwickshire NHS Trust (UHCW) within the past six to twelve

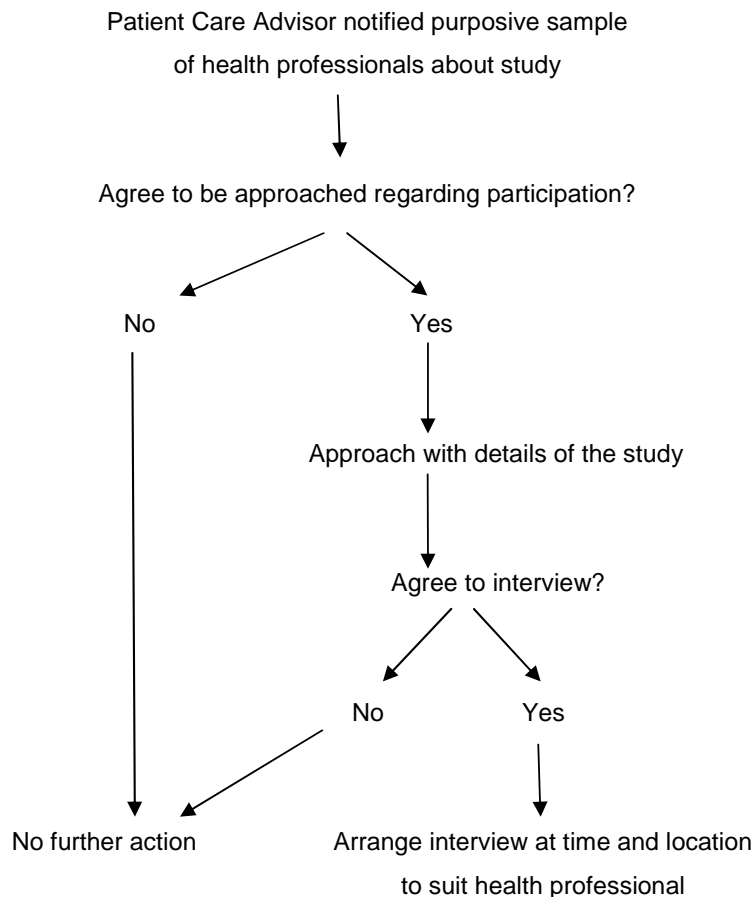
months. Trust staff used the National Strategic Tracing Service and Trust records to check for deceased patients and current inpatients. Of those not identified as deceased or current inpatients, a random sample of ten men and ten women was identified. Randomisation was done by adding a column to the excel data file of eligible patients' names and addresses and using the "=RAND()" calculation to give each participant a unique number between 0 and 1. Participant names were then sorted by this RAND number and the first ten women and ten men selected for the initial mail out of study invitations. It was aimed to recruit five to six men and five to six women to take part. From the initial batch of potential participants there were insufficient women recruited and so a further three women were randomly selected and approached to participate.

These patients were sent a covering letter from the PCA, a participant information sheet (PIS), consent form and reply envelope. Participants were invited to return the consent form, including their telephone number, if they were interested in participating. They were then contacted to arrange an acceptable date, time and location to conduct the interview. Participants were encouraged in the covering letter and PIS to contact the researcher if they had any queries before deciding whether to take part. Once participants had agreed to take part in the interview, a letter notifying of their participation was sent to the patient's General Practitioner.

### *Health professionals*

Please see Figure 3 for a summary of the Phase I health professional recruitment.

Figure 3: Flow chart of Phase I health professional interviews procedure



The PCA or researcher approached in person a purposive sample of health professionals with experience of caring for patients who had undergone CABG. It was aimed to recruit two GPs, two to three surgeons, four to five nursing staff, and two to three physiotherapists. Professionals were provided with an information sheet, consent form and copy of the interview schedule and the opportunity to ask any questions. If health professionals agreed to take part, a time and place to conduct the interview was arranged.

### *Interviews*

At the interview (see Appendix 2 for interview schedules), participants were asked if they agreed to the interview being recorded and were reminded verbally that comments they gave would remain anonymous and not be

presented in a way that allowed them to be identified. The prerogative of the participant to withdraw from the study at any time was reiterated. Interview audio-recordings were labelled only with an identifying number and participants were informed when the recorder was on and when it had been switched off. After the interview patient participants were asked to complete the questionnaire (see Appendix 3). These would be used in Phase II so were piloted with Phase I participants to test for appropriateness, ease of completion and to confirm an approximate completion time. At the end of the interview the researcher spent some time answering any questions the participant had and explaining how their comments would be used in the next phase of the study. Detailed field notes were made after all interviews to aid later analysis.

## 4.2 PHASE 2

All patients eligible for this study were approached regarding participation. Participants were recruited via two surgical departments, University Hospitals of Coventry and Warwickshire (UHCW) NHS Trust (University Hospital Coventry) and Royal Wolverhampton Hospitals (RWH) NHS Trust (New Cross Hospital).

### *Inclusion criteria*

- Over 18 years of age
- On waiting list to undergo elective CABG at UHCW or RWH
- Undergoing first-time CABG.

### *Exclusion criteria*

- Undergoing redo CABG
- Undergoing other procedures at the same time as CABG (e.g. valve surgery)
- Undergoing emergency CABG.

### **Sample size**

For this study, to detect a moderate effect size of 0.5 as a statistically significant difference in change scores on quality of life with power of 80% and a significance of 5% would require a sample of 128. Previous studies have reported varying attrition and death rates across the course of longitudinal studies (see *section 3.1.1*). Estimating a drop-out of 4.3% (the centre of the varying figures cited in previous studies) and a death rate from CABG of 2% (Patel, 2001) the number of participants needed would be 136. It was aimed to recruit a few more participants to take account of any deaths from other causes over the twelve month follow-up period.

### **Procedure**

Recruitment began in June 2005 for a six-month period at UHCW but fewer eligible patients than health staff anticipated were being referred for CABG so recruitment was extended for a further three months until March 2006. To increase participation the researcher attended the clinics of the two consultant surgeons performing most CABG operations and spoke personally to eligible patients to explain the study. As this did not result in an increase in uptake of the study, recruitment was also begun at RWH for a six-month period beginning February 2006.

Recruiting procedures were slightly different in each participating hospital, reflecting the differing administration practices. At UHCW, once patients were put onto a waiting list for CABG, their details were collected weekly from each Consultant's secretary. At RWH the Surgical Coordinator identified eligible patients on the waiting list and sent them study invitation packs directly to adhere with the local R&D approval stipulations. The study invitation pack included a Participant Information Sheet (PIS), consent form, questionnaire (Appendix 4) and reply envelope. Participants could choose to decline by returning the blank questionnaire, ringing or writing to the researcher and then no further contact would be made. If there was no response to the initial participation pack, one reminder was sent after two to three weeks.

The researcher liaised with the PCA at UHCW and the Surgical Coordinator at RWH to identify the date of surgery and date of discharge. UHCW Trust staff consulted the NSTS to check for deaths among the participants prior to the six- and twelve-month follow-up questionnaires being sent. At RWH no equivalent staff member could be identified to utilise the NSTS and so the Surgical Coordinator used Trust records to check for deaths among participants. A six-month post-surgery follow-up questionnaire was sent. As before, participants received one reminder if they did not respond within two to three weeks. Those who returned a completed six-month questionnaire and were not identified as deceased were sent a twelve-month follow-up questionnaire.

Participants recruited via UHCW were also invited to participate in the interview components of the study (see next sections for details). With limited time and resources, participants recruited via RWH were not approached about this component.

### *Interviews*

All male patients going onto the waiting list for CABG during July to September 2005 and who lived in the greater Coventry area were invited to take part in three interviews about their experiences of recovery after CABG. As fewer women undergo CABG and recruiting women had been difficult in Phase I, all female patients going onto the waiting list for CABG throughout the recruitment period were invited to take part in an interview. Despite this, insufficient female participants were recruited and therefore interviews were offered to additional male patients in January and February 2006 to increase participant numbers for this component of the study.

Participants invited to take part in the interviews were asked to indicate on the consent form if they would like to take part in an interview and provide their telephone number. These participants were telephoned, any questions answered and, if the participant still agreed to the interview, a time to conduct the interview was arranged. At the interview, participants were asked again if they agreed to the interview being recorded and were reminded verbally that



comments they gave would remain anonymous and not be presented in a way that allowed them to be identified. The prerogative of the participant to withdraw from the study at any time was reiterated. Interview audio-recordings were labelled only with an identifying number and participants were informed when the recorder was on and when it had been switched off.

A semi-structured interview schedule was developed (Appendix 5) from the literature and findings from Phase I. Topics covered included: feelings about having surgery, what would constitute a good recovery, what aspects of recovery have been difficult, confidence in healthcare staff, person characteristics, rehabilitation classes and social support. At the end of the interview the researcher spent some time answering any questions the participant had. Detailed field notes were made after all interviews to aid later analysis.

### **4.3 ETHICAL APPROVAL**

This research was approved by Coventry Local Research Ethics Committee (ref: 05/Q2802/3) and by local Research and Development Directorates at UHCW (ref: DE09/1104) and RWH (ref: 06CARD01).

## Phase 1: patients' and health professionals' views of recovery after coronary artery bypass grafting

### 1 BACKGROUND

Coronary artery bypass grafting (CABG), a revascularisation procedure for the treatment of coronary heart disease is effective in relieving angina symptoms and improving prognosis. However, many people do not report an improved quality of life, a return to normal activities or, therefore, experience a good recovery after the surgery. It is important to identify facilitators and barriers to recovery so that interventions can be developed to help maximise the benefit of undergoing such major surgery. Little previous work has utilised the experience of health professionals in identifying facilitators and barriers to recovery. Nor have patients been approached regarding what they consider to be a good recovery or the relevant factors in achieving this. Phase I interviews will provide the opportunity to examine and compare the views of patients and health professionals regarding barriers to recovery. This is an area of study that has not been reported in the literature. The results from these interviews will inform Phase II by identifying those aspects considered important to measure. In addition, patient participants will pre-test the questionnaire and cognitive neurological tests that will be used in Phase II, for appropriateness and ease of completion.

***The findings from this phase of the research have been accepted for publication (see Appendix 9 for details).***

### 2 AIM

To describe the recovery experience after CABG and to identify the perceived barriers to recovery after elective CABG from the perspectives of patients and health professionals.

To inform Phase II, a longitudinal prospective study with patients undergoing CABG and pre-test the questionnaires and cognitive tests.

### **3 METHOD**

#### **3.1 RECRUITMENT**

Details of participant recruitment for this phase are set out in *Chapter 3 Methodology (section 5.1)*.

### **4 ANALYSIS**

Interview recordings were transcribed verbatim and checked for accuracy. Codes, developed in the context of field notes collected, were apportioned to text and grouped thematically, following procedures for thematic analysis as detailed by Joffe and Yardley (2004). Coding was carried out on patient and health professional interviews separately. The findings were then integrated by identifying broad themes common to each data set. Two members of the supervisory team read a sub-sample of interview transcripts and independently analysed them to give an indication of the reliability of the coding. Questionnaires and cognitive tests were administered to patients to pilot their appropriateness and ease of completion, therefore, no statistical analyses was carried out on these limited data.

### **5 RESULTS**

#### **5.1 PARTICIPANTS**

##### **5.1.1 Patients**

A sample of 15 women and 20 men were identified initially by the patient care advisor (PCA). Of these none were current inpatients, one woman was identified as deceased using the national strategic tracing service (NSTS) and another could not be traced. A random sample of these eligible participants (excluding the woman who could not be traced) was approached to participate

in the study. In total 10 men and all 13 women were approached to take part and of these 50% (n=5) men and 46.2% (n=6) women agreed. There were no differences in terms of age or time since surgery between participants and non-participants. Demographics of patients taking part can be found in Table 1.

Women interviewed were generally older than their male counterparts, reflecting the age and gender differences typical in those undergoing CABG surgery (Society of Cardiothoracic Surgeons, 2002). One woman had never married, three women were widowed, all other participants were married. All participants reported their ethnic group as White British. Interview duration ranged from 23 to 66 minutes, with most lasting 35-45 minutes. Interviews with women were generally shorter than those with male participants. Four participants invited their spouse to sit in on the interview, although only one made substantive contributions to the discussions. All interviews were conducted in the participants’ homes.

*Table 1: Demographic data of Phase I patient participants*

<i>ID</i>	<i>Duration /mins</i>	<i>Gender</i>	<i>Age/ years</i>	<i>Ethnicity</i>	<i>Marital status</i>	<i>Relative present?*</i>	<i>Months since surgery</i>
P01	49.23	M	74	White British	Married	Wife	11
P02	66.12	M	55	White British	Married	Wife	10
P03	54.44	M	79	White British	Married	Wife	11
P04	40.01	M	73	White British	Married	None	8
P05	41.58	F	62	White British	Married	Husband	10
P06	42.58	M	59	White British	Married	None	9
P07	23.24	F	74	White British	Married	None	8
P08	36.59	F	65	White British	Single	None	8
P09	47.44	F	72	White British	Widowed	None	8
P10	34.22	F	72	White British	Widowed	None	6
P11	37.27	F	77	White British	Widowed	None	9

\*Four participants invited their spouse to join in the interview

### 5.1.2 Health professionals

Although not formally recruited to the study, several health professionals voluntarily gave the researcher their views on facilitators and barriers to recovery. These informal conversations were not recorded but detailed notes were made afterwards and were used together with the field notes to aid coding of the interview data. One General Practitioner was approached regarding participation but declined due to his heavy workload. No other health professionals declined to take part. Of the ten health professionals who took part, three were male. Two participants were surgeons, one a physiotherapist, two worked in the rehabilitation team and the remaining five were Registered General Nurses (RGNs). All participants had qualified from their professional training more than one year previously and seven had worked with cardiac patients for more than five years (see Table 2 for details). Interview duration was between 19 and 43 minutes. Some interviews were necessarily short to ensure minimal disruption to staff’s clinical work.

*Table 2: Demographic data on Phase I health professional participants*

ID	Duration /mins	Gender	Role	Years qualified	Years working in cardiac care
H01	40.13	F	Nurse	1	1
H02	20.50	M	Surgeon	14	8
H03*	32.47	F	Nurse	25	10
H04	20.22	F	Nurse	3	2
H05*	32.47	F	Nurse	20	16
H06	37.50	M	Rehabilitation (Physiologist)	6	6
H07	43.37	F	Rehabilitation (Nurse)	23	22
H08	23.53	F	Nurse	12	11
H09	23.17	F	Physiotherapist	3	0.6
H10	19.24	M	Surgeon	20	15

\*These participants chose to be interviewed together

Health professionals see patients at different stages of their journey (see Table 3). For example the rehabilitation team only see patients from around six weeks post-surgery onwards.

*Table 3: Points along the surgery pathway where health professionals have contact with patients*

Pre-surgery	Surgeons (H02/H10)	Nurses (H03/H05)	
Hospital admission	Surgeons (H02/H10)	Nurses (H04)	
ITU/HDU	Surgeons (H02/H10)	Nurses (H01/H08)	Physiotherapist (H09)
Up to 6 weeks post-surgery	Surgeons (H02/H10)	Nurses (H03/H05)	
6 weeks and longer post surgery			Rehabilitation team (H06/H07)

## 5.2 FINDINGS

Interview analysis showed that numerous barriers and facilitators to recovery existed and these were present both before surgery and throughout the recovery process.

### 5.2.1 Recovery

#### *Definition*

When asked what defines “recovery” both professionals and patients talked of a return to normal activities, whatever that was for the individual. These activities might include doing the housework, shopping, going to work, driving, playing golf and socialising with friends and family.

*It was just gradually I just started doing the normal things that I had been doing. Shopping and going out and just general, going out with friends and that. P05*

Patients considered post-CABG recovery in relation to their pre-operative levels of functioning. Those who had severe symptoms before surgery reported a quick recovery (around six weeks post-operatively), illustrated by their ability to do more than they could do before surgery. Previously, symptoms had impeded every aspect of their lives; post-surgery activities were now easily carried out, despite any residual discomfort from the surgery itself.

*I'm walking better. You can see we've got a hill here, but I got so that I couldn't walk up there very well. But now I find I can get up there. I can't run up it, but I can get up there with no problems. P07*

*I make a comparison with what my lifestyle was like before I went into hospital and things I could do, and I could do a lot more after six weeks I should think. I'd have been puffing and using my spray but I was making comparisons all the time. P01*

For those with few symptoms pre-operatively, recovery took a long time - six months or more. Post-surgery pain and disability from the procedure severely limited daily activities in a way angina never had. Thus, early post-surgery living compared less favourably with the situation before CABG.

*Did a double bypass. And since then it's been downhill! No, since then it's obviously, the recovery's been a bit frustrating at first you know. Because I wasn't that ill before, I felt a lot worse afterwards. After the operation I felt a lot worse because of the surgery. So that was frustrating because I thought, well, they keep telling me how well I'll be after the op! P02*

Patients did not talk of getting better than they were before; instead many expected to have less mobility and fitness than previously, citing age as the reason.

*I haven't got the full strength back in my arms or legs. But I don't know if that's down to my age or what. I can't expect to be sprightly like I was. P03*

Typically, patients referred to not having regained full strength after surgery and having surgical wounds that had not yet fully healed. This meant they felt they had not completely recovered.

*I'm still having a little bit of trouble with the wound, with the chest.... Here we are 11 months on and it still hasn't gone. It's going but it's a laborious process. It's still going to be there on the first anniversary.*  
P01

All patients interviewed had some residual soreness in the chest or the legs from the surgical procedures. However, most patients accepted these as small problems and they were often considered insignificant when compared to the surgery they had undergone. A similar attitude was expressed to the medication they would have to take.

*It's a small price to pay I suppose for your life. I've just got to put up with it.* P03

*I am still on tablets, beta blockers and cholesterol. I shall be on those all the time. I don't mind, as long as it keeps things going!* P05

### **Predicting recovery**

Whilst health professionals all indicated that they could usually identify those individuals who would not recover as well as others, they reported that it was complex and could often recount situations where patients had defied their expectations. It was difficult for health professionals to give approximate proportions of those patients who did and did not recover well after CABG, although one nurse felt around 20% did not recover well.

*I would say 75-80% do very well... whereas perhaps 20% they don't do as well... It isn't a great lot.* H04

Another nurse reflected that patients seemed either to do well or not, indicating a dichotomy, rather than a continuum, of recovery.

*You do tend to have, very rare that you find someone that is just plodding along nicely. Because you don't, you know, there isn't an in-between there. You either do well or you don't... I do find there's a split... H01*

Health professionals reported many factors that together suggested how well a person would recover. No one defining factor was more important than any other but rather there was a combination of issues that staff looked for.



*I've got a list of attributes and things to look for in terms of patients who are more vulnerable. H07*

### **Timeline**

Health professionals who worked in the hospital felt recovery took around six weeks although none noted any difference between patients with severe or mild symptoms prior to surgery. It is likely that hospital staff were commenting that, for the most part, patients would be physically and emotionally recovered at six weeks. At this stage patients would no longer require their specialist care and could be discharged. Health professionals who worked in rehabilitation felt full recovery took around twelve weeks, their time estimate perhaps reflecting their slightly different priorities of helping people return to full activity.

*[Patients] see me in six weeks time in the clinic, by that time the patient should be, to some degree back to their normal activities. H10*

*So, I think, a proportion of people you could say, by our standards, have fully recovered at twelve weeks. H06*

Health professionals all acknowledged that the first five to six weeks after surgery were likely to be extremely difficult for patients, with a gradual improvement thereafter.

*Quite a lot of the time, a couple of well-defined periods in recovery, where after that time [five to six weeks] usually people are starting to feel as if they've got some strength and stamina, their appetite's improved... by then they're still going to be extremely sore but the worst is generally behind them in terms of the horrible fatigue that they feel in the early post-op period. H07*

Patients also commented frequently on this initial five to six week period saying they had felt extreme tiredness, were unable to do anything around the house in terms of housework or cooking, could not spend much time with friends and family and were in severe pain that often prevented them getting a good night's sleep, as they could not lie down flat in bed. A sense of helplessness during this initial period was typical in patients' accounts.

*The first six weeks I must say was bad really...It's not being able to do anything really. You can't, you just can't do much at all when you've*

*had it. You're feeling rotten really, you know, but you can't do the normal things like housework or ironing or anything really, you can't do that. P05*

After that initial recovery period, patients entered a second phase of recovery, a period of rapidly noticeable improvement. This swift recovery was, patients felt, in part attributable to the rehabilitation sessions the majority had attended. These classes increased patients' mobility and encouraged them to take some exercise, often after having done little or no exercise for some time prior to surgery. The third phase of recovery described by patients was a very gradual improvement and concerned the complete recovery from surgery and the leg and chest wounds. Although all patients described these three phases of recovery, the durations varied. Whilst the initial recovery phase lasted around five to six weeks for all patients, those who had severe pre-operative symptoms felt they had almost completely recovered two to three months post-CABG. (See Figure 1 for a graphical illustration of the recovery trajectory).

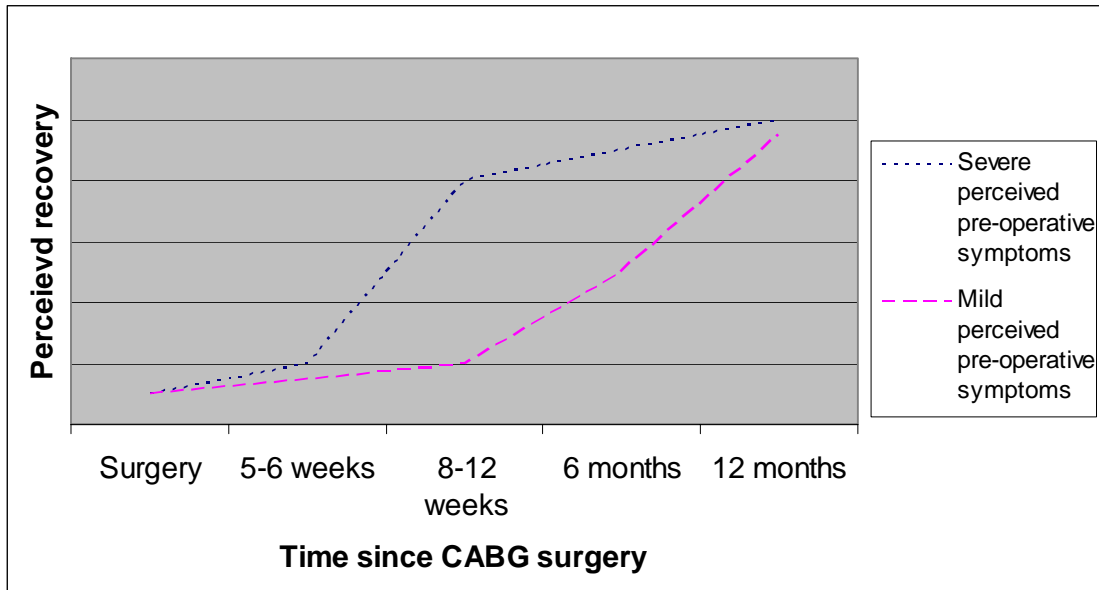
*It would be about eight to nine weeks I would think. P01*

*It's surprising how quickly people recover. P03*

In contrast, those who had mild pre-operative symptoms described a much lengthier second phase lasting several months and a third phase of recovery that had continued until at least six months post-surgery or was still continuing for the majority of interviewees.

*It took a month or at least a month before I began to feel improvements. And after three months I could feel I was getting better every day. I could wake up the next morning and feel different to the day before, it was quite a marked difference for a while. Now it's just a gradual, get better gradually and don't notice it. P04*

Figure 1: Illustration of recovery trajectory in patients reporting severe or mild pre-operative symptoms.



Interviews with health professionals and patients indicated a large number of factors affecting recovery including preparation for surgery, clinical factors, personality and post-surgery factors, which will be discussed in greater detail below.

Key points emerging from the recovery theme are presented in Box 1.

**Box 1: Recovery theme - key points**

- Recovery was perceived as a return to normal activities and as a comparison to perceived pre-operative functioning
- Full recovery after CABG included complete wound healing and the absence of chest pain
- Recovery was very difficult for all patients for the first five to six weeks, then participants felt there were noticeable improvements thereafter
- Perceived pre-operative symptoms were related to the perceived recovery trajectory.

**5.2.2 Preparation**

One of the broad themes emerging from the interviews was the effect of preparation for surgery on recovery. Preparation involved several aspects: the inability to prepare due to undergoing emergency CABG, attitude to surgery, information, and emotional preparation.

**Emergency surgery**

Several health professionals commented on the difficulties faced by patients who had undergone emergency CABG and who had had been unaware of their heart condition prior to admission to the hospital. Staff spoke of patients experiencing shock as they had no warning and, therefore, no time to adjust to what would be happening, and consequently experienced quite severe psychological difficulties in the immediate post-operative period that hampered recovery.

*Sometimes we get emergency admissions. So one minute someone's quite comfortably going about their normal life, have a heart attack or something, find themselves in ITU, you know, wake up in ITU with a big wound, lines in and obviously they're in quite a state of shock, and*

*they are often very, very slow [to recover]. If someone's had no warning it really knocks them for six and they are in a state of shock and everything frightens them, they are really anxious and just move along quite slowly, certainly in the beginning. H09*

*I often find after a couple of days they're quite depressed because they've had absolutely no time to prepare for what has just happened to them. H01*

Only patients who had undergone elective CABG were recruited to this study so none of the participants interviewed could comment on this aspect.

### **Attitude to surgery**

The effect on recovery of a patient's attitude towards surgery was highlighted by a few nurses. Each nurse gave a different viewpoint when recounting a patient's attitude towards the surgery. One commented on a patient's perception that CABG was an extremely serious operation, particularly if they had not undergone surgery before, in contrast to the comparatively routine perception staff had towards it. This perception led to patients being, in this nurse's opinion, over-anxious about the procedure, which was detrimental to a patient's preparation for the surgery and consequently their recovery afterwards.

*Sometimes people [healthcare staff] will think, unfortunately probably not a good thing, that heart surgery now as being an "operation". Whereas patients often think of it as more than that. Because it's **heart** surgery they perceive it to be more serious... I think it's anxiety about their idea of what heart surgery is. H04*

Patients interviewed all referred to their heart surgery as a very serious procedure supporting this nurse's views.

*Obviously there's a risk of any, especially what I've had done, obviously a higher risk than some operations. P02*

It is possible that this perception of seriousness derives from two factors. Firstly, the procedure itself is extremely invasive: surgeons are required to break the chest bone in order to gain access to the heart. One patient commented:

*So that's how they get into the heart. Which is quite severe isn't it?  
P05*

Another patient described the process of harvesting veins for the bypass.

*I don't know where they took the veins from... They do sometimes  
take them from inside their chest I think. I don't know where they take  
them from, I don't like thinking about that. Bit gruesome isn't it?  
Slicing you open... P03*

Secondly, the perceived seriousness may also result from comments that indicated a post-operative realisation by patients that, had the surgery not been carried out, they might not still be alive.

*Having spoken to them since the operation, it was, it needed to be  
done that quick. I just thought I'm one of the lucky ones... If it wasn't  
for the doctors and nurses I wouldn't be here now. That's it in a  
nutshell. P02*

Multiple-antibiotic resistant staphylococcus aureus (MRSA) was mentioned by the majority of patients interviewed, although many used the incorrect abbreviation. At the time patient participants had undergone their surgery MRSA coverage in the media was extensive, as one patient recounted:

*The main thing, I wasn't really scared of the operation it was the MOS  
[refers to MRSA]. My friends used to ring me up "did you see that [on  
TV]?" "Yes, I saw that!" I thought, I saw that, and it was all due to  
when I was going to have it! P05*

Another nurse commented that some patients misunderstood the purpose of surgery and seemed to think CABG was a cure for their heart problems.

*You can get some patients who feel that coronary graft surgery is a  
complete cure and they can stop taking their tablets: they don't realise  
that they've got an underlying disease, that they're actually chronically  
ill with angina. H07*

One patient referred to how unpleasant it was to be reminded that the surgery she had just gone through was not a cure. Although it was not the same nurse interviewed in this study, the ward nurse's comments were upsetting and had a detrimental impact on the patient's psychological recovery.

*One of the nurses came over to me and she said "remember it's not a cure". And I thought [grimaces] and I thought I've been through all this. I thought she needn't have come over and said. There's me trying to get better. She needn't have told me that, when you're trying to get better. P05*

Whilst the point made by the nurse was accurate, the timing perhaps was inappropriate. The nurse's comment could have been more beneficial had it been made later in the recovery process when it may have been taken in a more positive frame by the patient.

Of concern is the situation described by the other nurse and one of the surgeons who felt that a small minority of patients did not actually want the surgery and had felt some pressure to undergo the procedure, which often resulted in a poorer outcome.

*I do get the feeling that for some people it was too much of a hassle and they only had it done because, they'd not really thought it through and it's not a decision. Not very many but you do get a few... They don't do so well because they've not thought about it, they didn't want to have it done in the first place, they were quite happy just trotting along at home as they were. H01*

None of the patients interviewed in this study indicated they had been reluctant to undergo surgery. The benefits of surgery in terms of saving their life or improving their quality of life were readily identified. All patients interviewed felt the surgery was worthwhile and none had any regrets about having had CABG. Several patients commented they did not feel they had any option - if they wanted to experience a good quality of life they would have to undergo the surgery.

*My daughter said "Do you really have to have it done mum?" and I said "Yes, I really must have it done" or else otherwise, if I want to put years on my life. And not only that, it's not just putting years on your life, it's enjoying them. P09*

One of the patients interviewed had experienced a return of mild symptoms since his surgery. Although he was happy with the decision to undergo his first CABG he was reluctant, at this stage, to consider undergoing the procedure again.

*I do have reservations at the thought, if they turn round and say “we need to go again” because of all the angina problems, that wouldn't go down well. I wouldn't volunteer to go through it again. Well it's been, out of the operations I've had, it's been the hardest one to recover from. P01*

### **Confidence in staff**

Surgeons interviewed noted the beneficial impact on patients' recovery of confidence and trust in the surgical team and following their advice.

*Some people you talk to them and you reassure them and they take your word for it and they try on that basis to go on and work on their problem... Some worry and question in their mind, “is this the right thing, is he telling the truth?” H02*

While this surgeon was referring to post-operative recovery, patients referred to this trust being established prior to surgery and how their attitude to surgery was more positive as a result of feeling confident in the surgical team and getting on well with the surgeon.

*He [Consultant surgeon] was very, very good. I had a lot of confidence in him. When I first went to see him, he just sat back, he was so calm and so nice. I thought “I like him”. I came out quite “I'll be fine” I thought to myself, with him. P05*

One nurse noted that for some patients, however, trusting doctors they did not know well could be difficult and was a potential source of anxiety.

*You don't know any of these doctors and nurses around you and you're just meant to put your confidence in them. But I think maybe if you've been seeing somebody else for years, I think that's probably a bit hard to do. H01*

### **Information**

Provision of information to aid a patient's preparation for surgery and for recovery was often referred to by health professionals. Surgeons highlighted their role in ensuring that patients had sufficient information about the procedure, risks and benefits and were able to make an informed choice.



*The patients will tell you “what are my chances after the surgery? Am I going to survive this operation? What is the percentage risk of having morbidity?” We should tell them what they expect after the surgery, what are the risks, what are the benefits. H10*

Whilst the surgeons have a requirement to inform patients of the risks from surgery, this knowledge could have a major impact on how the patients prepare for their operation and how they approach their post-operative recovery. One nurse commented:

*The doctors will actually quote figures [mortality risk], now that might have some impact. If the doctors say “you’re overweight, you’re very old, you’ve got a 20% chance of not recovering” what’s that going to feel like? You’re probably going to think “hmmm, I’m not going to feel so good after this operation” whereas if somebody says “oh you’ll be no problem, 5% chance, you’ll be fine”, that does have an impact. H05*

Patients were asked how they felt about receiving this risk information. Few of those interviewed reported being overly concerned, all commenting that they believed surgeons were legally obliged to tell them morbidity and mortality risks associated with the procedure. In many cases patients felt the risk information had little impact on the decision of whether to have surgery, because they felt they had no real alternative.

*It can be off-putting of course [receiving risk information]. If you don’t sort of apply the basic logic that, I’m here because I’m in trouble and they’re offering to sort it out for me but they’re just warning me that it might possibly go wrong. You just have to bear in mind while you’re being given all this information, what’s behind it all, why you’re there. P01*

Despite the requirement to provide this risk calculation, details of the procedure itself and what to expect afterwards, several professionals interviewed noted that some people would prefer not to receive such information, as they found it distressing. In these cases staff could not then force this upon them and had to respect a patient’s choice about the amount and timing of information.

*Sometimes information is knowledge and education and people become more empowered. And sometimes people don’t want to know and, therefore, they’re not empowered and they are very anxious. At the end of the day you have to do what the patient*

*wants... If they don't want information you can't force that on them.*  
H04

However, professionals felt that for some patients providing detailed information actually helped them prepare for the procedure, a view shared by the patients interviewed.

*Telling them what to expect, how soon... Explanations really help the patient get their head round things.* H05

*I think you're not quite so worried then if you know that's what would happen.* P07

Although patients interviewed felt they had sufficient information, it appears that this was predominantly about the surgery itself with comparatively little about recovery. When asked whether they had received information on what the recovery would be like, patients repeated practical information they were told about not lifting heavy objects and wearing the anti-embolic stockings. However, a few would have liked to know more, as they were unaware what was 'normal', what pains were nothing to worry about as they were to be expected and when the pains required medical attention. Uncertainty about whether pains were a cause for concern caused some anxiety, as patients and spouses did not know if recovery was progressing as it should.

*The doctors can explain all the steps of the operation and take you through everything that happens, but does that really tell you how you're going to feel after the operation? No. So you don't know if what you're experiencing is normal recovery... You know, you get strange sensations, you don't know if that's normal or if you should be worried about it.* P05-spouse

### ***Emotional preparation***

Nurses reported that many patients went through an emotional preparation prior to their surgery that resulted in a better post-operative outcome and better long-term recovery. Patients who did not acknowledge what was about to happen and who did not talk about their impending surgery did not seem to recover as well as others.

*I think that some of the people that maybe come in that don't do so well, they chose not to think about it at home and maybe chose not to ask so many questions so they weren't so well prepared as other people. H01*

Several nurses interviewed felt that visiting ITU and the ward prior to surgery was beneficial in helping patients and their families to prepare. This preparation, in the opinion of the nurses interviewed, led to patients getting into the right frame of mind to approach the surgery, which seemed to result in better post-operative recovery.

*The ones who have come in and had a walk around the unit before their surgery and are orientated with the unit, and perhaps have met some of the staff... they just gear themselves up for it somehow and seem quite mentally prepared for what's going to happen. H09*

This emotional preparation once on the waiting list for surgery was also reported by patients. This preparation was exceptionally draining for patients when the wait was lengthy or if the surgery had to be cancelled.

*I'd just got myself ready in [four months before surgery actually carried out]. I was ready. I thought "there we go, we'll get it all over with" And then it kept dragging on, you know, it kept going on and on. And the further it goes on, you just, horrible feeling really... Mentally it wears you, all the waiting. P05*

Patients found the waiting so difficult because they wanted the surgery to be over and delays prevented them from continuing with their daily lives.

*About a month before, I was desperate to go in, I wanted to get it over with obviously, and I was all ready. I just wanted to get everything behind me and start again. P09*

Key points emerging from the preparation theme are presented in Box 2.

**Box 2: Preparation theme - key points**

- Staff felt undergoing emergency surgery prevents emotional preparation and results in poorer recovery
- Patients viewed CABG as major and serious operation: staff viewed CABG as routine surgery
- Staff felt some patients viewed surgery as cure for their heart disease
- Patients readily identified benefits of surgery in terms of improved quality of life and life expectancy
- All patients had trust and confidence in surgical team
- Patients not concerned at receiving mortality and morbidity risk information
- Information and visiting ward prior to surgery helped patients prepare although some patients wanted more information on what recovery would be like.

**5.2.3 Clinical factors**

Health professionals identified numerous clinical factors that could impede a person's post-CABG recovery. These factors, identified prior to surgery, could affect how someone is physically able to recover and include age, gender, presence of co-morbidities, such as diabetes, psychiatric illness and past medical history.

*As an example, if I have a patient 55 years old, gentleman, no marked co-morbidities, I will definitely quote him a good result from the surgery and a good recovery. If we are talking about a patient, an older, elderly patient, 75, 80 years old definitely I will quote him a little bit longer. H10*

These clinical factors could mean a patient experiencing a longer hospital stay and a lengthier recovery time but did not prevent any patient from recovering eventually.

*If they've got a pre-existing condition that might mean they have a longer hospital stay to start with and they might need a bit more support when they go home because they've got that bit further to progress. H04*

Although gender is a risk factor in terms of outcome from surgery, few nurses noted a difference between the genders in terms of recovery although one felt that men may do a little better. Whilst it was thought that younger patients would typically do better than the older patients, age was not necessarily a barrier to recovery.

*Men seem to do a bit better I would say. H01*

*We're constantly surprised by the late 80s, early 90s year old patient that does very well from it. H09*

One patient said she had left the hospital with a chest infection, which meant her recovery took longer as she had to recover from both the infection and the surgery at the same time.

*I left hospital with a chest infection... That took a bit of getting over, and I suppose it held me back a bit. P07*

## **Pain**

Many staff commented on differences in pain perceptions and how this affected recovery. If the patient had a higher tolerance to pain they would be more likely to carry out the physiotherapy exercises and mobilise more quickly than those patients whose lower tolerance to pain prevented them from carrying out those activities as often or as completely.

*If they feel pain they are less prone to get on to do things and that also has a psychological effect on them. Makes them less active and less capable of doing things. H02*

A couple of patients referred to pain affecting their ability to recover. These patients felt unable to do all the rehabilitation exercises as the pain was too severe, which affected their recovery, as they could not return to normal activities as quickly.

*I did walk, but I couldn't do too much. Felt quite weak at the end of it.  
And I'm not a baby where pain's concerned but you couldn't do it.  
Your body was telling you no, no, no. P08*

Key points emerging from the clinical factors theme are presented in Box 3.

*Box 3: Clinical factors theme - key points*

- Staff did not feel age and gender were necessarily a barrier to recovery
- Older patients and those with co-morbidities may take longer to recover
- Differences in pain tolerance could affect patients' ability to mobilise after surgery and so affect recovery.

#### **5.2.4 Person characteristics**

After the impact of clinical factors, health professionals felt person characteristics were the most important influence on post-operative recovery. Two main attributes emerged from the interview data: that anxiety and depression were barriers to recovery, and optimism and determination facilitators to it.

##### ***Anxiety/depression***

Health professionals acknowledged that undergoing surgery was, understandably, an anxious time. However, they noted that some individuals were naturally more anxious people and this anxiety trait, rather than a temporary anxious state brought on by the necessity of surgery, was detrimental to recovery. They suggested this was because naturally anxious people tend to assume the worst and become distressed not only at any minor

setbacks but also at normal everyday occurrences within the hospital environment.

*If people are very anxious they tend to do less well. They worry about everything. H03*

*[Anxious person] thinks "Oh my God, it's not going right" and then they have a panic "My heart is going to go wrong". H04*

A nurse felt that some anxiety was caused by patients and relatives being unsure of the implications of the medical equipment surrounding the patients, for example, whether monitor alarms were a cause for concern, a situation eased by keeping them informed.

*I think most of the anxiety is due to not knowing or misunderstanding. If you tell the family and keep updating them then I think that alleviates a lot of anxiety. H08*

Such anxiety, health professionals suggested, could lead to the patient becoming unnecessarily stressed, so affecting their physical and psychological health. Patients who are anxious may be unwilling to carry out their rehabilitation exercises and take longer to mobilise themselves because they are anticipating pain associated with the exercises. They may also fear that something will go wrong as a result of their actions and they may cause damage to themselves. In this way their recovery will be impeded because they are not following advice given by the health professionals that will actually help them recover after the surgery.

*If they don't move and don't do anything then nothing will go wrong and it will all be alright in a little while. I think they are frightened of being in pain; they are frightened of doing any damage... I think they're frightened of undoing what's just been done. H01*

Patient comments support those from the staff presented above, as they spoke of their fear of causing damage to their heart or to the stitches, or that they may be doing too much and that would result in another heart attack. This caused great anxiety and for some patients may have resulted in them doing the exercises less often or not as vigorously as was necessary for the maximum benefit to their recovery.

*On the whole, when I look back now, it was quite horrendous really, because I was always afraid. They said "your chest is wired" so I was always afraid that if you move or trip that it would burst open. P05*

### **Optimism/determination**

Health professionals felt patients who were optimistic and positive in their outlook on life had a better post-operative recovery, because the optimism manifested itself in a determination to recover after their surgery and do all the exercises they were told to do.

*You can see the ones that are very positive and are willing to help themselves with their recovery. They sit up in bed, they do their deep breathing, they'll do the coughing, they do the chest exercises, they mobilise as much as they can, which all helps their chest and heart when they get out. H01*

Health professionals elaborated that when recovery was difficult, when the patient was in pain or when they felt tired and weak, an optimistic person would not get disheartened but would be determined to recover and continue with their rehabilitation whereas a more pessimistic person may give up and this would, therefore, hinder their recovery.

*Generally, if people are positive they tend then whenever they have problems to minimise those problems and say "My leg's a bit sore, but never mind" or "I haven't got the appetite today; I'm sure tomorrow will be better". H03*

Patients interviewed also referred to determination aiding their recovery.

*I wouldn't give in you see. Weren't going to sit around. Pushed myself to the limit I did. Determination. P11*

Health professionals noted that this determination to recover was associated with a positive outlook. Such patients would do all the health professionals told them to do and make every effort to recover. One surgeon and a nurse referred to fighting spirit as being a good sign, in their experience, of a person likely to recover well after CABG.

*Most of the time, wives or family will tell you "he's a fighter", and this is a factor, which in experience, I can take and rely on. I definitely will*



*be very clear, very happy when I see these sorts of patients and I will be more optimistic doing this operation. H10*

A nurse also noted the relationship between being positive and having social support. Patients who were optimistic had more family and friends to help them, which in turn could help the patient keep a positive attitude. Thus, each factor was inseparable from the other.

*I think people with a bigger network of family and friends do better, they've got the support of family and friends that seems to keep them optimistic. H03*

Key points emerging from the recovery theme are presented in Box 4.

**Box 4: Person characteristics theme - key points**

- Staff felt anxiety was detrimental to recovery, as it would affect patients' psychological and physical health
- Participants identified that anxiety and fear of causing damage to themselves would also inhibit patients' recovery
- Patients who were optimistic would be determined and do that was necessary to recover, even when it was difficult or tiring
- Participants also linked a positive outlook to increased social support.

### **5.2.5 Post-surgery**

The last broad theme concerns how post-surgery experiences of the CABG pathway affect recovery.

#### **Intensive Therapy Unit/ward experience**

An important factor in recovery initially was the experience in the Intensive Therapy Unit (ITU) and the ward. In ITU patients were usually unconscious and aware only of brief moments. Health professionals considered the experience more stressful for the relatives, as this first impression of the patient after

surgery fostered a sense of them being very ill and requiring a lot of care from others.

*Intensive care I think is really very significant in terms of emotional trauma on the family. Patients at that point are often unaware and most of them are completely amnesic about their stay in ITU or HDU [high dependency unit] but, families have that trauma of seeing somebody on a ventilator and then to see them back at home they still perceive them as being very sick and in fact they're not they're often recovering quite well. H07*

The impression formed in ITU that a patient is very ill was a major barrier to recovery in the view of the health professionals, particularly if the patient was in ITU for an extended period. While staff encourage patients to return to normal activities quickly, relatives still had in their mind the memory of the patient as very ill and dependent and often feel an understandable need to maintain a high level of care for the patient when they returned home from hospital. Some nurses also felt that the patient adopted the role of a sick person if they spent longer than typical in ITU or on the ward and this frame of mind was difficult for staff to reverse.

*I think it affects the relatives because they'll say "well you know my husband is really poorly because he had to spend a week in ITU" and that is a part of recovery and I think they find that a big shock. H03*

*They go from being a 'normal' person like you and I to a 'patient'. H05*

Patients would commonly become depressed during an extended period in hospital. Staff identified this as due to a lack of perceived or observable progress, tiredness from lack of sleep and the constraints imposed from the ITU/HDU environment.

*Most of them do get depressed at some point. They're not getting better. They're often quite withdrawn, frustrated because they can't do anything and so they're often psychologically or emotionally, they're often suffering quite a lot just due to the environment as much as anything. They haven't got control over what happens to them really. H08*

Several patients interviewed commented on the difficult aspects of ward life, in particular the lack of privacy.

*You've got to watch who's going into the toilet, how long they're going to be, when they come out, anyone else going in. And then when you're in there there's no locks on the inside of the door. People having a shower and there's no locks on the doors. There's no room for modesty or anything like that. P03*

A few patients reported that a lack of appetite left them weak and tired, which they felt slowed their recovery initially as they found daily activities difficult. This aspect was not mentioned by health professionals, perhaps because the majority of patients are not in the hospital for very long and their appetite returns soon after discharge.

*I couldn't eat, didn't like the food, didn't like drink either and I was just sending it back because it tasted, everything it tasted so foul and because of that I think I slowed down. I hadn't a lot of energy, even to the point where I stood to have a chest x-ray, I passed out and I finished up on the floor. And that possibly was due to the fact that I just wasn't getting enough nourishment. P01*

Two patients interviewed recounted unpleasant sleep experiences whilst in the hospital. One man felt very disturbed as he tried to sleep and found he had no memories or dreams. The other man reported horrific dreams, which he attributed to the drugs he was on, and which had understandably caused great distress at the time.

*The dreams were that realistic it's as if it really happened. Terrible, terrible dreams. Well that never happened but it was that real. Building falling down, thunder and lightning, trains crashing, horrible dreams, nothing nice at all. I've never dreamt like that since I've been out so it must have been whatever drug I was on. P03*

One surgeon interviewed also commented that these sleep disturbances could be detrimental to the early phase of recovery as it resulted in a lack of sleep that affected the patient's overall well-being.

*Occasionally you get the patient saying they have sleep disturbances, and they have nightmares. That prevents them having a good night's sleep and that reflects on their general health and well-being. H02*

### **Peer comparison**

Many patients made comparisons with peers and often judged their recovery progress on this basis. This could be a positive reinforcement of how well they were doing, but could be detrimental to the patient's psychological recovery if the comparison was negative.

*I was in and out and there's blokes been there three weeks, four weeks, and had the same op and couldn't even stand up, sit up. P02*

*People often compare themselves to other people on the ward... They'll be looking at everyone around them and they'll see a couple of people have gone home that perhaps went to theatre on the same day as them and they're still here and why are they still there? H09*

Comparison with others also provided an opportunity to see that recovery was possible after the surgery, it was an achievable goal.

*Lots and lots and lots and lots of people have the operation and they've all been fine. P06*

*Seeing other patients sometimes progress and that makes them a bit inquisitive, like when we do the fitness assessments we take them through the gym environment and they can see other patients doing it and they look around and think "well he can do it, so can I" H07*

### **Rehabilitation**

Although one man reported not being offered or told about the rehabilitation classes all other patient participants interviewed were positive about its benefits for recovery. These benefits came from two main aspects, the physical exercise programme itself and, primarily, social support from peers. That other people in the classes had similar experiences was perceived as beneficial by patients interviewed. Their peers had a true understanding of what they were going through and could offer empathy.

*If I didn't go there I wouldn't be exercising at all. P10*

*To meet like-minded people, with similar operations and similar experiences, that's good, you know, because you think nobody else is going through what you're going through... Someone that's had*

*similar things, they understand don't they? They know what you've been through sort of thing. P05*

### **Social support**

Social support came from several sources, hospital and rehabilitation staff, peers at the rehabilitation classes and from family and close friends and was experienced whilst in the hospital and long after discharge. Support from peers in the rehabilitation classes has been noted in the section above. Support from staff whilst still on the ward was valued, especially by relatives. The wife of one patient interviewed recounted the stressful experience on ITU and how the support of staff was helpful.

*I sort of, got alarmed a few times, you know, watching the monitors and they calm you down and they say, you know, it's natural, you know, nothing to worry about. Very reassuring. P01-Spouse*

In the main, patients felt the support from staff invaluable. Many patients referred to the proactive phone calls from the after-care team during the first few weeks after they came home. These were appreciated and made patients feel that they were still important and being looked after by the hospital and had not been abandoned.

*When I came out she [nurse] used to call around and chat to me, or if she couldn't make it she'd phone up and see if I was OK and if I needed her she would come. P08*

In addition, the knowledge that they could contact the hospital if they had any concerns was very reassuring to patients and their families. They felt they could call at any time, even during the night, and not be considered to be over-reacting or causing a nuisance by staff.

*It was easy to get good advice... It was good to know there were people there that we could look upon for advice and to help, you know. It did make it less stressful knowing there was back-up there. Knowing they were there was very good, an important part of being made to feel at ease. P02*

This feeling of on-going support came not only from the hospital staff but also the rehabilitation team. One patient interviewed, who had experienced a return

of angina, was touched that the rehabilitation team telephoned regularly to see how he was.

*I mean the guy that did most of the deal with me and he heard about this angina problem and he rings me up to ask how I'm getting on still. That's how they are. P01*

When asked what aspect was most beneficial to recovery, participants all answered, their family. It was often noted how it would have been very difficult to recover after the operation without anyone at home to help as patients were completely dependant on family.

*I couldn't have managed on my own. Shower and dress and put the stockings on and things. You're helpless really. I found I was really helpless without somebody, you know, here. P05*

Staff identified a correlation between having support and good recovery. The physical aspects of care provided by families included not only help with personal care but also with cooking meals to encourage appetite.

*Physical care is important as well. If you had someone to cook your meal, if someone actually put a little tempting meal in front of you, you'd have a go. Whereas, if you had to make it yourself you wouldn't bother. That's physical care as well. H03*

Two staff interviewed felt that just having someone there wasn't necessarily enough to help the patient recover well. A family that did not help or support the patient was a barrier to recovery.

*You have the fit and well relative that is willing and on the ball and the fit and well relative who doesn't pay much attention to the needs of the post-cardiac surgery patient. I think this might potentially create a barrier for recovery, either physically because more possibility of infection, poor nutrition or psychologically. H02*

Participants also referred to emotional support. Having someone to talk through any concerns and questions was beneficial as was the nurturing provided by the family.

*Somebody on their own doesn't have that support, even moral support and I think moral support and talking aid their recovery. Sharing problems and feeling they've got that support and "what shall we do?"*

*Shall we phone them, shall we phone the doctor?" and I think that helps them a bit if they can talk it through. H05*

*It was nice to be waited on! I was made a fuss of! P07*

Whilst acknowledging that there were many tasks patients would not be able to do for themselves, many health professionals felt that sometimes patients and families slipped into 'patient' and 'caregiver' roles once at home, and this could impede recovery as the family would take on the caring role and do small everyday tasks for the patient, with the best of intentions, so preventing the patient from mobilising quickly and aiding the recovery process.

*You do get some people who are very caring and want to look after their relative and want to do everything for them whereas you'll say "no, come on you can do that!" so we have to try and get them out of the patient role and not push them further into that patient role. H09*

One nurse commented on the association between personality and social support. They identified that those patients who were more positive and outgoing often had a larger social support network, suggesting, health professionals felt, that these individuals had more support because they were more pleasant to be around and provided an enjoyable experience for the carer.

*Surely there's a direct correlation between positive attitude and having a network of people and friends. I mean, if you're miserable and depressed, no-one, you're not going to have friends come round to see how you are. If they've got that attitude and they're smiling, positive, that attracts people to them, throughout their life. So that's why they have the network of people because they are fun to be with. H05*

### **Effect of surgery**

There were several effects from the surgery that prevented participants from returning to their normal daily activities and hobbies and hence interfered in their achievement of a complete recovery. One such effect was a loss of confidence. Patients discussed how, after their surgery, they had lost a lot of confidence and felt unable to undertake tasks and activities they had previously undertaken with no problems and were, therefore, not the same person they

were previously. The effect of having surgery was profound for a couple of the patients interviewed.

*I try and do what I did before and I think "hang on, can't do that anymore"... I'm aware of my limitations a little more. P02*

*In the first few weeks it was like, as if your life, OK, you've been given you life back, but could you ever do or go back to the person that you were before the op? Would I ever have that strength or confidence to do those things again? P08*

For two women interviewed it was apparent that the lack of confidence reflected an anxiety that they may have a heart attack or some other medical problems whilst they were away from home. This loss of confidence was long lasting as the women had both had their surgery around eight months previously yet still experienced periods where they felt unable to carry out normal tasks outside the home. Such lack of confidence, therefore, affected perceived recovery, as it meant they did not feel they had "returned to normal" where they could carry out everyday activities without anxiety and fear.

*You do lose your confidence. I didn't really want to go out. It is gradually coming back, but I do have days where I feel I definitely can't go out... Some days I don't want to go out on my own in case something goes wrong again. Just the confidence is gone. P07*

One woman had also experienced a loss in her ability to concentrate; this meant she was only able to focus on her hobbies for very short periods. She had also noted that she was more forgetful after her surgery. No other patients made reference to these effects from the surgery, although one surgeon noted that neurological problems were not uncommon after surgery. The effect of this meant the participant could not return to how she was prior to surgery as she could no longer carry out her hobbies as she could previously, and thus recovery was not as complete as she would have liked.

*I found I couldn't concentrate ever so well. A little bit forgetful... I couldn't concentrate on my hobbies for very long, for about half an hour and then I'd give up. P07*

*We are talking about up to, in some studies, 70% or two thirds of the patients having some degree of psychological effects from the*



*surgery. We are talking about lack of concentration, memory loss to some degree, minor, I'm talking about, all minor. H10*

Key points emerging from the recovery theme are presented in Box 5.

*Box 5: Post-surgery theme - key points*

- Comparison with peers enabled patients to see that a good recovery was possible
- Rehabilitation class attendance was viewed positively as providing both an exercise programme and social support
- Follow-up phone calls from the hospital after-care team provided a valued source of continued help and support
- Practical and emotional support from family and friends was beneficial, with patients reporting they could not have managed on their own, although staff warned that this help from family could be detrimental recovery if it prevented patients resuming everyday activities
- Post-CABG loss of confidence and loss of ability to concentrate was reported by a few patients.

**5.2.6 Summary**

*Table 4: Barriers and facilitators at each stage of the patient journey*

<i>Timeline</i>	<i>Facilitators</i>	<i>Barriers</i>
Pre-surgery	<ul style="list-style-type: none"> <li>• Trust and confidence in healthcare staff</li> <li>• Receiving information about procedure</li> <li>• Meeting staff/seeing ward</li> <li>• Emotional preparation for surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Undergoing emergency surgery</li> <li>• Being reluctant to have surgery</li> </ul>
ITU/ward post-CABG	<ul style="list-style-type: none"> <li>• Trust and confidence in healthcare staff</li> <li>• No complications</li> <li>• Determined/optimistic personality</li> <li>• Higher pain threshold</li> </ul>	<ul style="list-style-type: none"> <li>• Clinical risk factors</li> <li>• Longer ITU stay</li> <li>• Negative peer comparison</li> <li>• Anxiety/depression</li> </ul>
6 weeks post-surgery	<ul style="list-style-type: none"> <li>• Instrumental social support</li> <li>• Emotional social support</li> <li>• Determined/optimistic personality</li> <li>• Higher pain threshold</li> </ul>	<ul style="list-style-type: none"> <li>• Negative peer comparison</li> <li>• Lower pain threshold</li> <li>• Anxiety/depression</li> </ul>
6-12 weeks post-surgery	<ul style="list-style-type: none"> <li>• Instrumental social support</li> <li>• Emotional social support</li> <li>• Rehabilitation classes</li> <li>• Determined/optimistic personality</li> </ul>	<ul style="list-style-type: none"> <li>• Negative peer comparison</li> <li>• Negative effects of surgery (lower cognitive functioning, loss of confidence)</li> <li>• Anxiety/depression</li> </ul>
12 weeks and longer post-surgery	<ul style="list-style-type: none"> <li>• Emotional social support</li> <li>• Rehabilitation classes</li> <li>• Determined/optimistic personality</li> </ul>	<ul style="list-style-type: none"> <li>• Negative peer comparison</li> <li>• Negative effects of surgery (lower cognitive functioning, loss of confidence)</li> <li>• Anxiety/depression</li> </ul>

## **6 DISCUSSION**

This study has extended the small body of work using qualitative research methods (Gardner *et al.*, 2005). Specifically, the views of both health professionals and patients to recovery after CABG were explored. The key finding from this study is the influence of pre-operative symptoms on the recovery trajectory. Patients with perceived severe symptoms prior to surgery reported recovering quicker than those with fewer symptoms. Patients described recovery in terms of a comparison to life prior to surgery, so the discrepancy in recovery trajectory may reflect that those with fewer perceived symptoms felt worse off after surgery than they were previously - CABG did not initially appear to have improved their quality of life – and so it took longer for them to see a perceived difference compared to pre-CABG. This observation needs further exploration. Lindsay *et al.*, (2000b) reported recovery taking nine months for some patients but did not identify a disparity in recovery time depending on pre-operative angina severity.

Findings indicate that, in accord with previous work (Knoll and Johnson, 2000; Theobald and McMurray, 2004), both health professionals and patients defined recovery as a return to normal functioning. Similarly, the impact of wound healing problems and chest wall discomfort (Anderson *et al.*, 1999; Theobald and McMurray, 2004; Gardner *et al.*, 2005; Tolmie *et al.*, 2006), a prolonged ITU stay (Bapat *et al.*, 2005) and post-operative sleep disturbances (Pierce, 2004; Gardner *et al.*, 2005) on recovery are confirmed. The distress of a prolonged wait for surgery (Fitzsimons *et al.*, 2000; Lindsay *et al.*, 2000b; Ivarsson *et al.*, 2004; McCormick *et al.*, 2005), benefits of preparation for surgery (Lindsay *et al.*, 2000b; Higgins *et al.*, 2001), acceptance of needing surgery (Lindsay *et al.*, 2000b), the positive effect on recovery of confidence in surgeons (Higgins *et al.*, 2001) and the impact of clinical factors (DeRose *et al.*, 2005; Herlitz *et al.*, 2005) have been noted in previous studies.

Another important finding, also noted in other work (Doering *et al.*, 2002; Kattainen *et al.*, 2004) is the need expressed by patients and their carers for more information on what is 'normal recovery'. Comments indicated that

knowing whether post-operative pains were typical, and not indicative of a problem requiring medical attention, would ease anxiety, and so facilitate recovery. The advice, reassurance and 24-hour point of contact for queries provided by the after-care nurses was, therefore, particularly valued.

Also emerging from this study is the impact of ITU on recovery. Past studies have noted reduced quality of life in cardiac patients experiencing a lengthy or stressful ITU stay (Schelling *et al.*, 2003) and the detrimental effect on spouses (Engstrom and Soderberg, 2004). Although not explicitly referred to by participants in this study, the possibility that undergoing surgery, and perhaps a long ITU stay, may lead to Post Traumatic Stress Disorder (PTSD) in some patients and/or carers, or heighten stress in those already experiencing PTSD is worthy of further study. Previous research has found a substantial number of post-cardiac surgery patients exhibiting PTSD (Stoll *et al.*, 2000; Schelling *et al.*, 2003; Oxlad and Wade, 2006) and this may negatively influence post-CABG recovery.

All the patients in this study who attended rehabilitation classes found them of great benefit (Lindsay *et al.*, 2000b; Gardner *et al.*, 2005) and felt that they provided much valued social support. Participants also noted the importance of personality traits on recovery after CABG. Being anxious or depressed was identified as a barrier (Peterson *et al.*, 2002; Blumenthal *et al.*, 2003; Burg *et al.*, 2003) while being optimistic and determined (Scheier *et al.*, 1999; Ben-Zur *et al.*, 2000; Gardner *et al.*, 2005) was a facilitator to recovery. Participants expanded that anxious patients may not carry out rehabilitation exercises for fear of somehow undoing the surgery they had just had or precipitating another heart attack. Positive, optimistic and determined patients in contrast persevered even when recovery was difficult, a finding supported by other research (Aspinwall and Brunhart, 2000).

The final theme emerging from the patient interviews was the effect of surgery – and the only instance where gender differences were apparent. For two women, the effect of surgery was a loss of confidence that inhibited daily activities and leaving the house due to fear of another heart attack or something

going wrong (similarly reported by Robinson, 2002) so causing the individuals to recount a poorer experience of recovery. One woman also described experiences associated with cognitive decline, an issue that has been identified previously (Bergh *et al.*, 2002; Selnes *et al.*, 2004).

The findings from this study show clearly participants' views on the links between various factors affecting recovery, indicating the difficulty of ascertaining the impact on recovery of one factor without considering those related to it. Having confidence in the health care staff (a trust in powerful others, Wallston *et al.*, 1978) could also mean that patients are less anxious in general about the surgery and about undertaking the rehabilitation exercises recommended, as they trust that the health professionals would not recommend anything that could potentially cause them harm. Pessimistic people may become depressed by unfavourable peer comparisons, a barrier to recovery, whereas naturally more optimistic people may not experience negative consequences from this. The impact of personality was most commonly linked with social support, in that more depressed people were considered less likely to have as much social support as people who were more positive to be around. However, clinical factors also play a role in influencing the social support offered to the patient. If the patient is in pain, or has not been sleeping well they could also be less positive people and so not draw others to help them in the same way as those who are optimistic and cheerful.

The possible interaction between issues related to recovery necessitates a holistic approach to their investigation. The study has revealed that studying one facilitator or barrier in isolation would not provide a complete understanding of how that issue impacts on recovery, as recovery is a multi-dimensional issue.

## 6.1 LIMITATIONS

It was disappointing not to recruit any GPs to this study; however, several participants had contact with patients after their hospital discharge, in the case of the rehabilitation team for many months after, and could, therefore, comment on barriers and facilitators to recovery in the longer term. Recruitment of

women to the study was initially slow but it was possible to recruit sufficient men and women of varying ages to give a good representation of the people typically undergoing surgery.

## 6.2 RELIABILITY AND VALIDITY

Typically, qualitative studies require fewer participants (Arksey and Knight, 1999), so the 21 participants were sufficient to meet the aims of this phase of the study. While traditional assessments of reliability and validity cannot be applied to qualitative research, this study aimed to meet, where applicable, the principles of “quality control” (Yardley, 2000). Many of the findings from this study concur with previous works so giving confidence in the validity of the new findings emerging from the data. However, it must be acknowledged that there may be a self-selecting bias in the people who agreed to interviews - that the people who participated are different from those that did not. Additionally those who took part may have shared only particular experiences, so findings from this study may not represent a complete picture of recovery for these individuals. Demographically participants were representative of the typical patient population undergoing CABG.

## 6.3 CONCLUSIONS

Considering the views of health professionals and patients has given a fuller understanding of how the barriers and facilitators identified can affected post-CABG recovery. This has indicated areas where staff can, at all stages of the patient's journey, provide information and support that could enhance longer-term recovery. This study also identified the need for health professionals to provide information and support to the whole family, as carers contribute greatly to a patient's recovery. As this study has shown, patient populations may comprise varying viewpoints and experiences that a large-scale survey alone may not detect. In-depth investigation of the topic area provides greater detail to aid understanding of the disparity shown in recovery after CABG. Past research has indicated the impact of certain barriers and facilitators to recovery but has often failed to identify the process by which these factors operate. The

importance of considering recovery as a holistic concept is apparent from these findings. The majority of issues raised interact with each other and cannot be considered as single concepts but must rather be investigated as part of the whole. Such a holistic approach will be taken in Phase II of this research.

#### 6.4 PHASE II

In addition to providing valuable information on the views of health professionals and patients to recovery after CABG, Phase I also helped to inform Phase II of this study.

The questionnaire piloted with Phase 1 participants was, for the most part, easy to complete although a couple of participants sought further explanation about completing the PANAS. The questionnaire took 15-35 minutes to complete, (typically 25-30 minutes). It was clear from the interviews that recovery is a long process with different facilitators and barriers operating at different stages. This finding supports the longitudinal, prospective approach planned for Phase II. Findings from the interviews also suggested the importance of dispositional optimism to recovery, an aspect not initially included, so this was added to the questionnaire and the PANAS, which assess mood rather than disposition, was removed.

The next chapters detail Phase 2 of the project; a longitudinal prospective study.

## Phase 2: Patients' experiences of recovery after coronary artery bypass grafting

### **1 BACKGROUND**

Phase 1 interviews gave an indication of barriers and facilitators to recovery after CABG and offered an insight into the processes by which these factors operate. Phase 2 builds on the information gained and uses a prospective approach to help identify issues present prior to surgery that may impact on recovery.

### **2 AIMS**

To explore the barriers and facilitators to recovery after elective CABG in a longitudinal, prospective qualitative study of patients awaiting surgery.

### **3 METHOD**

Details on recruitment to this component of the study are set out in *Chapter 3 Methodology (section 5.2)*.

### **4 ANALYSIS**

Interview recordings were transcribed verbatim and checked for accuracy. Codes, developed in the context of field notes collected, were apportioned to text and grouped thematically, following procedures for framework analysis. Please see *Chapter 3 Methodology (section 2.2)* for a description of the analysis method. One member of the supervisory team read a sub-sample of interview transcripts and independently analysed them, using the thematic framework, to give an indication of the reliability of the coding.



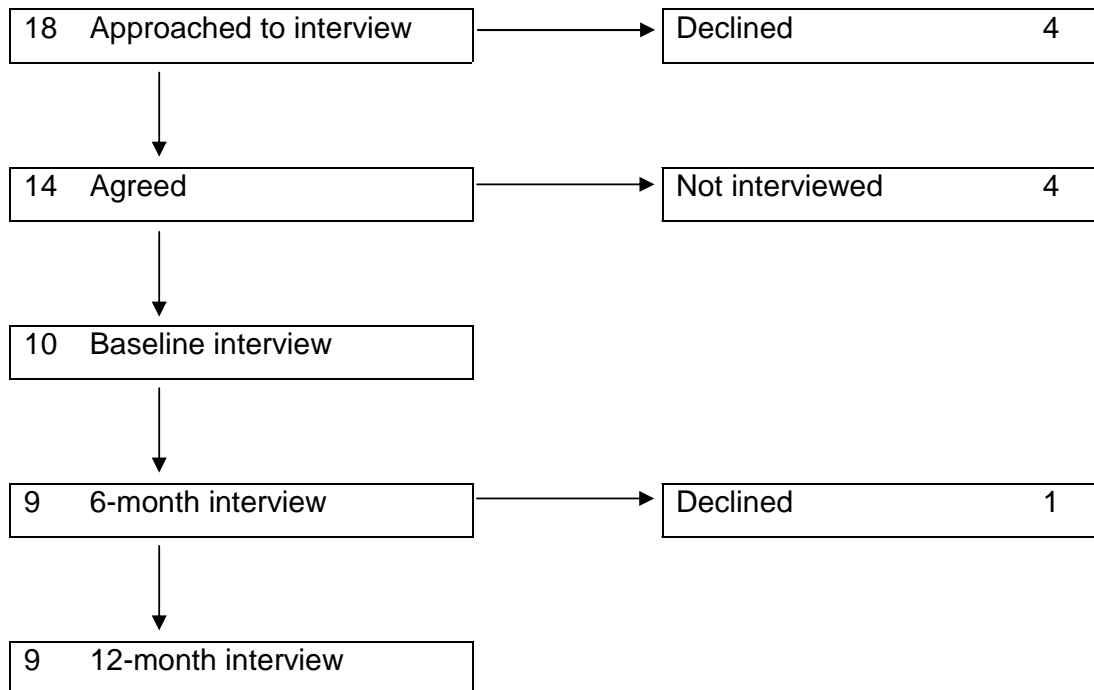
## 5 RESULTS

### 5.1 PARTICIPANTS

Details of participant recruitment to the interview study component can be found in Figure 1.

Participants were not approached regarding this component if they lived too far away and visits would be too time consuming and costly for this study. Of the 30 participants approached to take part in an interview, questionnaires were returned by 18 (two participants who did not return the questionnaire subsequently declined surgery). Of these, four (two men and two women) declined an interview, three (all men) agreed to an interview but sufficient men had already been recruited and one woman agreed to an interview but had her surgery before an interview date could be arranged. Interviews were conducted with the remaining ten participants. One participant withdrew from the study at the six month follow-up but the remaining nine participants completed all three interviews.

*Figure 1: Participant recruitment*



Demographic details of participants taking part in the interview component can be found in Table 1.

*Table 1: Demographic data of Phase II interview study patient participants*

<b>ID</b>	<b>Gender</b>	<b>Age*</b>	<b>Marital status</b>	<b>Ethnic origin</b>	<b>Duration /mins Baseline</b>	<b>Duration /mins 6 months</b>	<b>Duration /mins 12 months</b>
104	M	72	Married	White British	16.47**	48.59**	22.08
107	M	58	Married	White British	43.45	80.22**	79.23
111	M	76	Married	White British	32.46	77.24**	61.35
113	F	75	Married	White British	13.30**	27.19**	19.48**
121	M	62	Married	White British	26.10	79.13	64.32**
135	M	74	Single	White British	17.30	38.35	26.21
143	M	66	Single	White British	28.31	Withdrew	Withdrew
159	M	81	Married	White British	23.43**	95.07**	42.45**
229	M	67	Married	White British	63.36**	65.12	64.43
242	M	71	Married	White British	30.06**	56.06**	39.28

\* Age at time of baseline interview

\*\* These participants invited their spouse to join in all or part of the interview

Eight participants were married, and all reported their ethnic group as White British. Interview duration ranged from 13 to 63 minutes at baseline, from 27 to 95 minutes at six months, and from 22 to 79 minutes at twelve months. Spouses, at the invitation of participants, were present at six baseline interviews, at five of the six month and three of the twelve month follow-up interviews. All interviews were conducted in participants’ homes.

## 5.2 FINDINGS

The thematic framework (see Appendix 6) noting the key issues, concepts, themes and codes was developed from the interview transcripts. Inter-rater reliability was good with no differences in coding found.

An example of the charting process can also be found in Appendix 6, whereby each coded passage of text was transferred into a chart to allow consideration of codes across the dataset and by individual (Pope *et al.*, 2000).

Findings from these interviews identified a system of barriers and facilitators to recovery after CABG and the links between them. This system is represented in Figure 2 and identifies that some barriers and facilitators have their influence on recovery both directly and indirectly via other factors.

Quotations are used to illustrate the factors identified through analysis of the data ("B" refers to a comment made during a baseline interview, i.e., pre-CABG, "6M" and "12M" refer to a comment made during a 6-month or 12-month post-CABG follow-up interview).

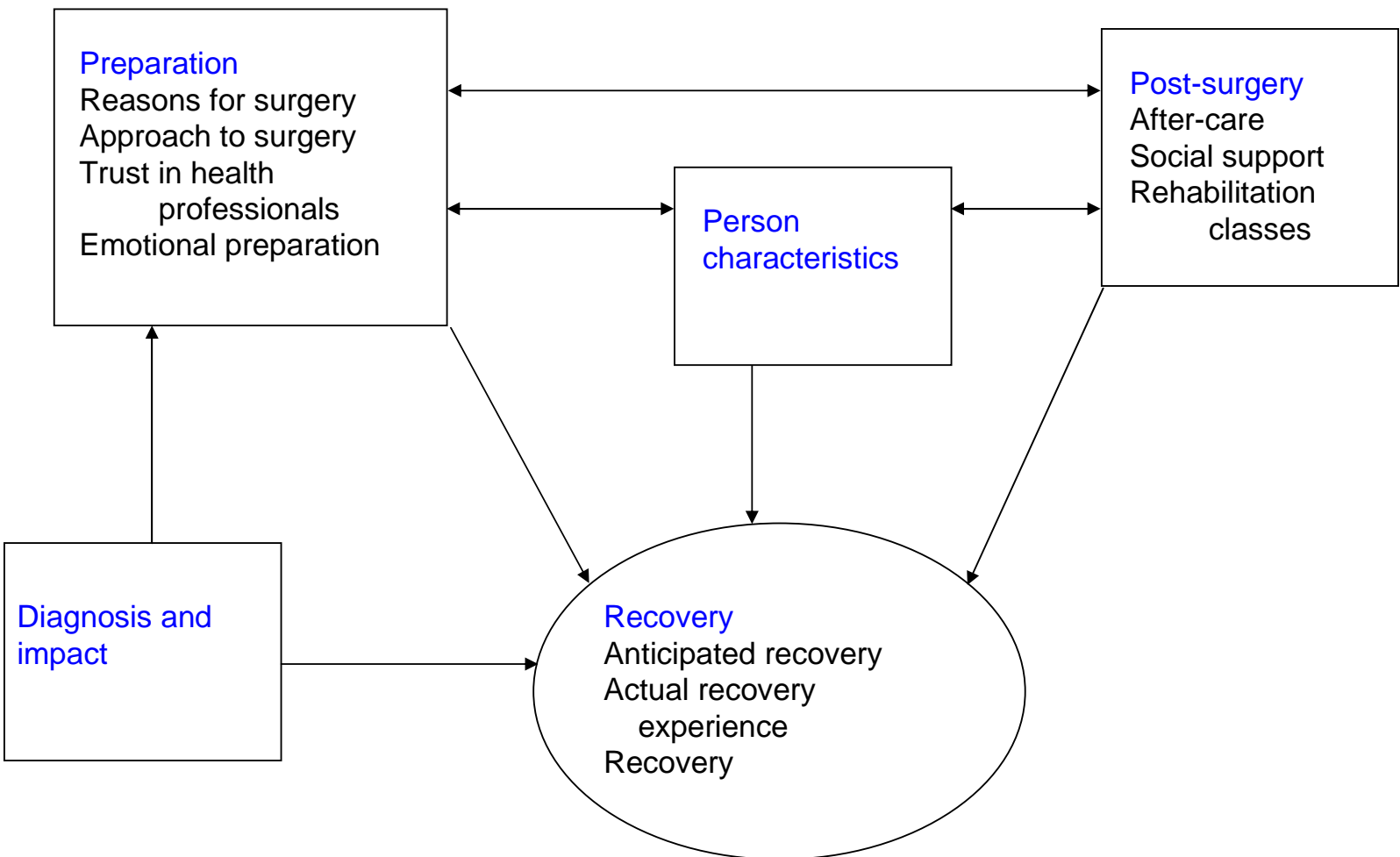


Figure 2: System of barriers and facilitators to recovery

## 5.2.1 RECOVERY

### *Anticipated recovery experience*

Prior to surgery, participants were asked what they expected their recovery to be like. This anticipated recovery experience was based primarily on information given by the surgeon, but was also based on the experiences of peers and written information from sources such as the British Heart Foundation (BHF, see Box 1 for a summary of information provided by the BHF, 2004).

*They've given me a booklet with all sorts of information. The driving it says four weeks. That's what it says, doubtless build up. B-135*

Comments suggested participants expected to be mobile soon after surgery and carry out everyday activities within a few weeks, gradually building up over the months. None felt recovery would be particularly difficult and all felt they would back to normal and fully recovered from surgery within a few months.

*All I can think of is there'll be a lot of discomfort. More discomfort than anything else. B-229*

*I always think I've got five or six weeks up to eight weeks to two months within reason. I don't expect to be lying in bed long. I expect to be on my feet within a couple of weeks and mobile and moving around you know. I'd say about three months in total. B-143*

The anticipated recovery experience was heavily influenced by the reports from family, friends, neighbours and acquaintances. That surgery had been successful for others was reassuring. Participants often made comparisons between themselves and these peers on the basis of age, weight and number of bypasses to be done during surgery; they then used the experience of these peers to estimate what their own recovery would be like.

*What does help me, I know a lot of people, because I'm at that age, there's a lot of people that have had it done. For example, I was talking to a guy yesterday and he had a quadruple and he said "you'll have no problem". And they put your mind at rest. B-121*

*Most of the folks I've met that had that kind of operation they seemed to have recovered from a lot of it so I'm thinking well if they can and they're a bit heavier, more robust, stocky people and they've gone through it. B-143*

*Box 1: Summary of BHF information on CABG for patients and carers*

- Most heart patients stay in the intensive care unit for about 24 hours and leave hospital about six or seven days after their operation.
- It takes most people about two to three months to recover fully after the operation, but time varies depending on severity of disease, age and post-operative complications.
- Getting moving again very soon after surgery helps patients recover more quickly.
- Quite a few people feel depressed a few days after the operation; this is a natural reaction to the stress of major heart surgery.
- Some people have very bad or vivid dreams, these will pass with time.
- Many fear they are not making good progress, it is perfectly normal to have these feelings, some days will be better than others.
- A confident, positive attitude is very important and will help recovery immediately after surgery.
- The breastbone that was split for the operation takes many weeks to heal. Patients may often feel pain in their muscles but this is normal healing and nothing to worry about.
- Don't be worried about the chest wound opening again, the stitches or clips are very strong and secure so they won't break, even when you cough.
- For the first three to six months patients are likely to feel very tired, this should gradually improve over twelve to eighteen months.
- Some people have problems with their memory and concentration after surgery but this usually improves within six months.
- Cardiac rehabilitation classes help patients recover and get back to as full a life as possible.

All participants gave a similar timeline for their anticipated recovery, expecting to be completely recovered by around three months post-surgery. Unfortunately at the six month post-CABG interviews several participants reported that they did not feel they had fully recovered as yet.

*It is improving. At the rate it's going to be probably another six months to complete recovery. 6M-135*

Two participants reported feeling low that their recovery was not going as quickly as they anticipated based on the information given. The actual recovery experience reported by participants is described below.

### **Actual recovery experience**

As anticipated, participants recalled little about their time in the Intensive Therapy Unit (ITU), as all were only there for around a day. One participant reported having vivid dreams whilst in ITU, which he attributed to the after-effects of the anaesthetic.

*I had these weird dreams while I was in intensive care. Everything around me was strange and I dreamt, well I was imagining I suppose, that the sister looking after me there was something not right, she kept making all these funny noises. I think the effect of the anaesthetic was making me see things that weren't there. 6M-107*

Spouses, invited by participants to join in the interview, reported that visiting their husbands in ITU was an unpleasant experience, particularly if the participant had not been in hospital before. However, spouses noted that the nurses there were supportive and kept them informed of what they were doing at all times.

*He was an awful colour, very, very white. Bit of a shock seeing someone like that really. 6M-107 Spouse*

*Nurses were very good, they were talking to him all the time and talking to the carers telling us what they were doing. 6M-242 Spouse*



After ITU, participants were transferred onto the High Dependency Unit (HDU) or onto the ward. All participants were complimentary about the overall care they received whilst in hospital and often praised the nursing staff. A couple of participants reported that although they had lost their appetite whilst in hospital this returned soon after discharge.

*I couldn't fault it one little bit. The nursing staff and all the staff there were very nice and very helpful 6M-121*

*It took a while to get back into eating anything. I think I lost a stone in weight. 6M-159*

Several participants had wanted to speak to the surgeon who carried out their CABG to thank him and to ask him questions about the operation before they were discharged, but reported not having the opportunity to do so.

*I would have liked time to discuss my operation, unfortunately that never came about. He [Consultant Surgeon] came on the ward "It was a long job, eight hours" he said. I said "oh was it" and he walked off. I don't know why it took so long. But I would have liked to have known. I don't know because there was nobody I could ask. I've no idea really but it would be interesting to know what happened in my operation. 6M-107*

Two participants, who described themselves as anxious people, felt their surgery had taken longer than was typical at six to eight hours (typically CABG would take around three to five hours, Mullany, 2003) and were extremely concerned that the surgeon may have found something else wrong, such as cancer, whilst carrying out the CABG and wanted reassurance that the surgeon was not withholding this information from them. This anxiety was still present at the twelve month follow-up interview with one participant and may have been alleviated had he had the opportunity to discuss it with the Consultant Surgeon.

*It always come back to mind, I was down the theatre six hours, and it keeps preying on my mind - what haven't they told me, what have they found down there that they haven't told me. Preying on my mind a little bit and it worried me to death. They [nurses] said you're perfectly well, there were no problems and all the rest of it but you've always got doubts. Worried me, worried me, I thought they'd found a cancer. 12M-121*

Asked what recovery was like in the first few weeks after discharge from hospital participants reported everyday tasks, such as making a cup of tea, having a shower and getting dressed, were extremely difficult.

*Showering in the morning at home, I was shattered. I went to bed for half an hour, absolutely shattered. 6M-121*

*I had problems moving about for the first few weeks. Couldn't pick things up off the floor, silly things I couldn't do. Couldn't reach into the cupboard to get a cup. 6M-107*

There was consensus that the anti-embolic stockings all patients wore for approximately four to six weeks after surgery were a problem. Patients often could not put the stockings on by themselves and reported their spouse or carer having great difficulty with the task. Difficulty sleeping was also common in the first few weeks; lying flat in bed caused discomfort as it pulled on the chest wound so many participants found it easier to sleep propped up in a chair.

*I couldn't get down, bend down to put them [stockings] on and my husband's disabled and he couldn't do it for me and that's the biggest problem. I struggled to do it myself. They are very difficult to put on, because they come right to the top and they are very tight. 6M-113*

*The only problem I had was when I came home the first night trying to lie somewhere comfortable because obviously you're still wired up inside and you couldn't, I didn't want to lie and stretch, you've very apprehensive about lying there and your shoulders ached and you couldn't get comfortable, that was difficult for a couple of nights. 6M-121*

As this last quote also illustrates, early recovery was an anxious and emotional time for some participants. A lack of confidence about going out of the house alone was reported by a couple of participants. One elaborated that his lack of confidence was in part due to concern that he might not get better and the surgery might not be worthwhile, a concern that eased as the improvement post-surgery became noticeable. Another participant explained he was cautious when moving around because he was concerned that he may cause damage to the wounds.

*It probably affected my confidence as well, but it did get better. I was probably wondering am I going to feel better than I am, is it all going to be worth it in the end? These things go through one's mind. It's just, it was a worry that I wasn't going to get back to anything like I was before I was before the surgery but as the days went on I realised that I was progressing and could walk further each day. 6M-249*

*I think sometimes a bit emotional, I got easily upset, over silly things really. I was wary of movement and doing things. I was over-cautious all the time. I was frightened of doing something wrong that would harm, you know, the operation, the stitches or whatever. So I was very cautious. 6M-107*

However, no participants reported experiencing any pain during this time, only what they described as discomfort. This lack of pain was remarked on by a couple of participants.

*After the surgery what surprised me is that I didn't have any pain at all. The only discomfort I had was lying in bed. 12M-121*

The enforced relative inactivity of the early recovery period was also noted by those participants who prior to surgery were typically very active and described themselves as people who 'have to be doing something'. Recovery gradually improved over the following weeks and months with participants building up activities. Several noticed the loss of function after several weeks in hospital and doing little activity.

*Sitting here for two months doing nothing. That's hard, and boring sort of thing. Can't do anything, just sitting here, keep looking at the clock "oh another hour. Oh another ten minutes" and you're sort of wishing your time away in a way. 6M-104*

*I was only in hospital for about a week and the muscle wastage is quite remarkable. 6M-242*

## **Recovery**

Integral to this research was an identification of what participants considered recovery to be. Participants indicated pre-surgery that once they could carry out everyday activities without angina symptoms they would feel they had recovered. Post-surgery recovery was also described in those terms; a lack of

pain when carrying out normal activities indicated a recovery from surgery. Healing from leg and chest wounds was also considered part of recovery after CABG.

*Getting back to normal, when I say normal, basically walking without having that pain. B-229*

*When the pain had gone, the chest pain, and when this leg had cleaned up a bit. 12M-121*

Most participants considered that life post-surgery compared favourably to pre-surgery. Activities that were previously difficult to undertake were now possible and quality of life was greatly enhanced.

*I'm a darn sight better off now than I was twelve months ago. Quality of life is far better now than it was, which is what it's all about. I really couldn't do anything, it was silly. I can't believe how bad I was compared to how I am now. 12M-107*

At the six month follow-up interviews many participants felt they had recovered from the surgery, although a couple felt at twelve months follow-up that there had been further improvement and complete recovery was achieved around eight to ten months post-CABG. A few participants appeared very despondent during the six month post-surgery interview at what they perceived to be a lack of progress in their recovery, particularly when compared to the likely outcome given by the consultant surgeon. Although not fully recovered, these participants reported great improvements at the twelve month follow-up interviews.

*Things haven't gone, I was promised so much. With me not smoking my body was in perfect condition. He [consultant surgeon] said, "you'll be doing six miles" he promised me so much. Well, that gives you hope doesn't it? 6M-111*

*You resign yourself to "am I going to get better? No". When it's been going on for six months, a year you think, well... It may get better but I don't know. I've no real hopes to be honest with you. I think I'll always be like this. 6M-159*

Comments suggested participants noticed a marked improvement in their recovery at around three months post-surgery; for some this corresponded with

what they felt to be complete recovery, for others this was the start of a period of continuing improvement.

*About Christmas, so three months, and we went to [holiday abroad] and I felt great out there. 12M-104*

*I would say probably about three months but then as the weeks went by it went from the three month period it improved immensely. So I would say three months and then it was a very rapid recovery. 6M-242*

Many participants reported residual wound healing problems. The incisions in the leg and chest took several months to heal, causing some concern amongst spouses in particular about whether they were infected. Pain in the chest when coughing or sneezing was also still present for many at the six and twelve month follow-up interviews.

*The biggest problem I've had is with my leg, where they took the vein out. That has only just healed. That has only just healed within the last fortnight, three weeks, scabbed over. Took a long time to heal. 6M-121*

*I still get pains in my chest from coughing but it is still getting better. 6M-135*

Since CABG, a few participants had noticed an intermittent weakness or tiredness in their legs when walking. This caused concern for participants who were unsure whether this was a return of their angina symptoms, a new problem that was only manifesting now that the surgery had been carried out or whether the leg weakness was directly caused by the surgery itself. All participants mentioning this problem had seen their GP about it but had either had what they believed to be an unsatisfactory response from the GP or were still undergoing tests at the time of the interviews.

*I am getting a problem with my legs; my calves really start to hurt and my hips and then I stop and it goes away and off I go again. It's as if there's no power in my legs, as if they've gone weak, but at the same time it's as if my calves are seizing up, have gone tight. 12M-107*

A couple of participants reported being a little out of breath occasionally, which they often put down to their age. However, all participants felt their surgery was worthwhile, even if their symptoms hadn't disappeared completely, as CABG prevented further physical functioning deterioration and decreased the possibility of a heart attack, thereby prolonged their life.

*I still get a bit out of breath but then again I am 73. I keep putting it down to old age so it's alright. 12M-104*

*I think I would have got, and been worse now than I am. My condition isn't a lot better but I expected it to have got a lot worse. I'm still on the plus side I think. It is, I think, an improvement on what I would have been otherwise. It would probably have killed me. 12M-135*

A few participants noted the experience made them feel grateful for the opportunity surgery had provided and how they appreciated life more post-surgery.

*I see things happening around me that make me feel grateful. It makes me feel good that I'm still here and I had the surgery. 12M-121*

*I'm going to enjoy life and enjoy what I've got and things like that and I think that's a positive attitude. 12M-135*

One participant who described themselves as anxious discussed at the twelve month follow-up interview how he couldn't be sure he had fully recovered and would have liked a last check with a health professional. This check would provide an opportunity to discuss any concerns regarding residual pain and medication. This participant, unlike others, did not report a good relationship with his GP who may have been able to provide this reassurance.

*I feel I have [recovered] but it would be nice to be reassured. I feel pretty good except this business with my legs and the doctor's [GP] not telling me what's happening. I feel there should be a twelve month follow up, they can say, right you are now fit. A clinic, answer questions, if you've got specifics like I have. Also medication, have I got to take those for the rest of my life? Just a year or two? No-one's said anything. I think it would be handy because you're sort of discharged after three months, six months and you're still not really fully recovered. 12M-107*

Key points emerging from the recovery theme are presented in Box 2.

*Box 2: Recovery theme - key points*

- Prior to surgery participants anticipated recovery would be difficult for five to six weeks and would be fully recovered by three months
- While this was the case for most participants a couple did not report a complete recovery one year after surgery
- All participants found hospital nursing staff exceptionally good but would have liked to speak to the consultant surgeon before they were discharged to ask questions about the surgery
- Recovery was perceived to be when participants could return to their usual activities and when leg and chest wounds had healed
- A loss of confidence and tendency to get upset easily were reported by some participants, as were wound healing problems and a return of symptoms.

## 5.2.2 DIAGNOSIS AND IMPACT

### *Diagnosis*

Participants were asked at the first interview, whilst they were awaiting surgery, about their diagnosis and the impact of any symptoms they had. Most had known about their heart condition for some time and some had experienced a heart attack in the past.

*I knew from a previous angiogram I had five year ago that I had blocked arteries and I was on medication for that. B-159*

However, several participants had attributed their angina symptoms to old age and indigestion and had not considered that the breathlessness, tiredness and chest pain might be related to their heart.

*I thought I'd better go and see the doctor because I was taking something for indigestion because it seemed to be after meals. B-121*

*I just happened to mention [to the GP] one day I said "listen, I get a bit out of breath now", I thought they would say it's old age, that's all I thought it was. It's a wonder I mentioned it, you know... B-104*

### **Impact**

Many everyday activities caused breathlessness and chest pain in some participants, although this could usually be relieved by resting or taking their Glyceryl Trinitrate spray. In some cases, however, participants reported that the impact of symptoms on daily living and quality of life was quite severe.

*Now I've got me spray and the tablets I'm not too bad, it isn't too bad at all. When I sort of have to walk any distance it comes on, but you prepare yourself for it now. You can have the spray before you do these things. B-229*

*You feel like, not always, but you feel like [mimes gasping for breath]. You never get out, but it's a fact, you're frightened to go out. You're a prisoner in your own home in a sense. Can't get out. B-159*

Participants reported undergoing an angiogram and several were told during this procedure by the cardiologist that they may need heart surgery. This was a shock to those participants who were either unaware they had a problem with their heart, or who thought their heart problem could be treated without surgery.

*When he told me after the angio [angiogram] that I'd got one completely blocked and one severely narrowed I was gob-smacked. I was astounded, I didn't think I'd got that problem. I don't mind admitting when he told me I cried. I don't mind admitting that, I cried. I didn't expect it. 12M-121*

*I had an appointment with the surgeon, and that shook me because I didn't realise I was seeing a surgeon, I thought they would give me some tablets and that would be it. 12M-113*

Key points emerging from the diagnosis and impact theme are presented in Box 3.



**Box 3: Diagnosis and impact theme - key points**

- Some participants were aware of their heart problem but others attributed the symptoms to getting older and/or indigestion and so the need for surgery was a shock
- For some the symptoms had a severe impact, preventing participants from carrying out any activities, such as getting dressed, without pain and breathlessness.

### 5.2.3 PREPARATION

#### **Reasons for having surgery**

Participants reported several reasons for agreeing to undergo surgery: necessity, to regain functioning, the experiences of peers and because it was recommended by health professionals.

The majority of participants referred to having no choice about whether to have CABG. Surgery was a necessity as participants felt the alternative was a heart attack and/or sudden death and thus they had no option but to undergo surgery. Several participants recalled peers who had died suddenly and felt that they had to take advantage of the opportunity offered by surgery to avoid something similar happening to them.

*I've not got any choice, because if I don't have the surgery I'm going to drop dead, simple as that. I've got to have the surgery. B-107*

*I suppose you think you're lucky really. Some people don't get this chance, it happens and it happens and that's it. You know a good friend of ours, three years ago, said to his wife "I don't feel too well today" and she said "well go and lie down" and he never woke up again. B-229*

Another major reason for undergoing surgery discussed by participants was to regain physical functioning. Participants saw surgery as a means of returning to a level of activity similar to that before symptoms of breathlessness and chest pain encroached on their daily lives. This regaining of previous physical

functioning and an increase in quality of life was considered by participants to be a reasonable outcome from surgery given the experiences of peers who had undergone similar surgery.

*Hopefully I get this done as soon as possible, give me a new lease of life. Some quality of life, as long as you can get out, that's what it's all about. B-159*

*I think all the comments that we've heard from friends and relatives regarding heart surgery and bypasses has been very positive. It seems a wonderful surgical operation that's completely transformed their lives. I haven't heard a negative comment at all. B-242*

The principal reason cited by participants for having surgery was that it was advised by the surgeon. Participants talked of having trust and confidence in the consultant surgeon and his recommendation to have surgery carried much weight with participants. Often the surgeon referred to the likely benefits of surgery in terms of improved quality of life and survival. Participants reported that the survival prognosis was bluntly given by surgeons, leading participants to feel surgery was a necessity and thus they had no choice.

*Well I think the main reason was just because the doctor recommended, it was recommended from the hospital. He [consultant surgeon] said that I could please myself whether I had the operation but if I didn't have the operation then I wouldn't see two years, that was a bit of a shock. 6M-113*

*He [consultant surgeon] said, this is on the plus side, he said he'd get rid, he said "you'll have no more angina pain", you know, which is good. The way he said to me "you can virtually guarantee it'll be 100% when it's done". You know, pain free, no angina again. B-229*

### **Approach to surgery**

Participants described themselves as either relaxed or anxious about the surgery specifically.

*I mean, if something happens while you're in theatre, that's it, you won't know anything about it anyway. So why worry? B-104*

*I'm sure when it comes to it I won't want to go in. I'll be very apprehensive and I'm sure I shall be scared. B-121*

Several participants mentioned not surviving surgery; those who were relaxed about surgery said they were not concerned about that prospect, as they would be unaware of it, but others who described themselves as anxious people were concerned about this and about the impact on their family.

*I'm going in there and they'll put me to sleep and if I wake up [makes thumbs up gesture] and if I don't [makes thumbs down gesture]! [laughs] I'm quite happy. B-159*

*You know you're going to be put to sleep like and you hope it's going to go alright. What's going to happen if it doesn't go right? You know, you worry about others. B-111*

Other specific aspects were mentioned that concerned a few participants. One participant was particularly concerned that surgeons may find something else wrong during surgery, a concern that the participant reiterated during the follow-up interviews. Two others were anxious about the endotracheal tube (used during surgery and the immediate post-operative period) and feeling choked by it. During unrelated surgery many years previously another participant had woken up so was understandably anxious about that happening again during his CABG. All participants, whether anxious about surgery or not, were concerned about the difficulties for their spouse and other family when visiting them whilst in hospital. Several participants lived more than 15 miles from the hospital, the distance being around 25 miles for two participants so relatives would have a lengthy journey to visit, with car parking at the hospital particularly problematic.

*That they'll open me up and find something that I don't want them to find. Cutting me open and finding something that shouldn't be there. B-121*

*The breathing, or not being able to breathe. Because it's quite frightening, when you can't breathe, that's my main worry I think, it's this feeling of being smothered really. B-107*

*When I had a thing for my leg, I actually come round during the surgery. And I worry over things like that. Whether I'll come round, it's probably better sedation now. Things like that, and it does worry you a bit. B-111*

These anxious participants reported recovery taking longer, usually because they had issues, questions or concerns about wound healing or possible recurrence of symptoms and until they were resolved they felt recovery was not yet complete.

With regard to post-surgery, the unmarried participants had concerns about how they would manage on their own, although both had made arrangements to limit any problems they might face by enlisting the help of neighbours and friends.

*On the practical side, I am worrying about that. The notes say you ought to have someone around for a fortnight or so. I live on my own, I have to do everything. Some of the things, I'm not going to be able to do physically at least for a period. They're my concerns.*  
B-135

### **Trust in health professionals**

Although some participants were anxious about undergoing surgery, all were confident in the surgical and nursing teams and trusted the surgeon's abilities. This trust was often created by the surgeon being personable and engaging with the participants and their family. This personable "bed-side manner" in turn helped ease some of the anxieties of participants and reassure them and their spouses about the surgery; the surgeon's confident manner decreased participants' anxieties about undergoing the procedure.

*He's [consultant surgeon] got a very laid back bed-side manner and I would think he's the perfect man, you know, for steadying people's nerves and anxieties and that. I felt a lot better after I saw [him].* B-242

*It was wonderful treatment, couldn't have had a better surgeon. He's [consultant surgeon] just got a very nice manner. You feel if you're going to put your life in someone else's hands, I'd be happy if it was his.* 6M-107 Spouse

Many comments reflected a passive stance to undergoing surgery, with several participants reporting that adherence to health professionals' instructions would result in better recovery.

*They're in charge, you just lie there. You're in their hands, you've just got to do what you're told. If they say jump, you jump and that's it! B-104*

*You just do what they tell you when you're in hospital and you'll be fine. 6M-104 Spouse*

### **Emotional preparation**

Once patients agree to CABG they are placed onto a waiting list, but may not receive a date for the procedure to take place for some time after this. Typically patients are notified of the date for surgery only one or two weeks in advance. Waiting for this surgery date was difficult for many participants. For some, waiting meant an increase in anxiety and worry that another health problem would interfere with the surgery going ahead or that they may have a heart attack, an issue that also caused considerable anxiety for the spouses who sat in on the interviews.

*The only thing that worries me, because we're waiting, I know he says he's alright, but when he was at the airport and it [heart attack] happened so quick and that frightens me to death in case it happens. B-229 - Spouse*

*The waiting is making me anxious, which makes me poorly. I suppose it pushes my blood pressure up. B-107*

Waiting also meant participants could not prepare emotionally for surgery as they felt they were constantly on edge waiting for a surgery date to be set and a notification letter to arrive from the hospital. All but one of the participants were retired and during the interviews commented frequently of their joy at being able to take numerous holidays and visits away to see children and grandchildren. Being unable to plan these trips whilst waiting for a surgery date to be set was, therefore, a source of considerable frustration.

*If you don't know you're going to have it, it's different isn't it? You don't keep working yourself up. B-113*

*All this waiting was a problem because we wanted to go away on holiday, we wanted to go and visit the grandchild and we couldn't arrange anything because of this. 6M-121*

Four participants reported having their surgery cancelled on at least one occasion. Although understanding the reasons necessitating this postponement, participants had prepared themselves to have the procedure and having to prepare for a second or third time was a source of annoyance.

*They had emergencies, or so they said, and you have to accept it. That was annoying, and upsetting. Because you'd built yourself up to get ready for it. It was just a bit annoying that twice it had been cancelled. 6M-121*

Participants reported being very prepared for the actual surgery, as they had an opportunity to ask questions and had received what they described as sufficient information about what the process involved and the first few days post-surgery from the surgeon, the pre-admission nurses and from leaflets, for example those provided by the BHF.

*He told me roughly what the operation involved; he gave me some idea of the chances of success or failure if you like. I got this booklet, which has quite a lot in. I asked one or two questions when I went into the pre-med [pre-admission clinic] and got a little more information. B-135*

However, a couple of participants reported not having been given much information about what recovery would be like once they were discharged from hospital, although this did not appear to be a cause of concern, as participants felt they would receive that information later and these participants did not report a longer or more difficult recovery than others.

*I'm sure they'll tell me about it [recovery] when I'm in hospital. It's one of the questions I shall ask. It doesn't worry me, but it's something they haven't mentioned and perhaps they should have done. After-care is important I think. B-121*

At the follow-up interviews participants reported that in general they had received all the information they wanted about surgery and recovery and this accurately reflected their actual experiences.

*I did read the aftercare and the actual information they gave us was pretty accurate. 6M-242*

A few participants, who described themselves as anxious people, noted minor aspects about which they had not received adequate information, in particular how tiring showering would be in the first few days. Without the information to pre-warn of this situation, the participants worried that it indicated something was wrong.

*What they didn't tell me was how hard it would be to shower yourself. That really knocked me about, I wasn't expecting that. Of course when that happened I thought there was something wrong with me. 12M-121*

This participant also expressed concern about the future and whether the bypass would need to be re-done as he reported this hadn't been adequately covered by healthcare staff.

*I don't know how long these things last so that's perhaps one thing they didn't explain if you like. Do they fur up again in 10 or 20 years or what? What happens? There wasn't much of that to be honest. 12M-121*

Key points emerging from the preparation theme are presented in Box 4.

*Box 4: Preparation theme - key points*

- Participants felt they had no option about whether to have CABG as the alternative was a heart attack or sudden death
- Reasons for undergoing surgery also included regaining physical functioning, reducing pain and breathlessness, and the positive outcomes of peers who had undergone CABG
- All had complete trust and confidence in the consultant surgeon, which was engendered by them being personable and friendly and relaxed about carrying out the procedure
- Waiting for surgery was a cause of anxiety, as participants feared a heart attack and were unable to make any plans for the future
- Participants were either relaxed or anxious about undergoing surgery, the latter reporting they had wanted more information about recovery and what to expect.

#### 5.2.4 PERSON CHARACTERISTICS

Three general person characteristics were identified from participants' comments during the interviews; being relaxed and easy-going, being determined and positive and being active and independent.

Some participants described themselves as relaxed and easy-going people who did not get troubled easily. Others in contrast described themselves as anxious people who worried about surgery and other situations in their lives. Anxious participants tended to report a slightly longer recovery and reported that they had more questions and difficulties during that time.

*Don't get bothered by anything really, just take it as it comes. 6M-104*

*I worry over every little thing I do, which I needn't do really, I worry over everything. I don't sleep well, I make mountains out of molehills*



*sort of thing, worry about what's going to happen, it's just how you're built, ain't it. B-111*

Many participants said they felt a need to always be doing something, which made the enforced inactivity of early post-CABG frustrating.

*I've always, get up and do something. You don't sit lying around. I could never sit reading a book. I can't just sit and relax for long. B-111*

For this last participant, recovery was slow and thus being active again, as he was before surgery, was hindered, which made him feel despondent over his recovery, which he felt was taking a very long time.

*I got a little bit down because I weren't doing anything. With me being so active before it was a little bit disappointing, you know. It makes you mad, that's what it is, not being able to do what I want to do. I feel if I can be doing these things I shall be happier. 6M-111*

Lastly, many participants referred to being determined and positive people. This determination and positive outlook meant participants felt optimistic that they would recover after surgery and determined to do everything possible to achieve it.

*I wanted to get back playing golf, I wanted to get back to normality. I wanted to get back on holiday. I was determined to get well and I was determined to do everything in my power to get well. I wasn't going to let it beat me. I think you've got to be positive, I was always positive I was going to get better. 6M-121*

*I'll probably put in a bit of extra effort and make myself mobile. B-107*

Key points emerging from the person characteristics theme are presented in Box 5.

**Box 5: Person characteristics theme - key points**

- Some participants described themselves as anxious people, worrying about everything, others in contrast said they had a relaxed, easy going outlook on life
- Those who said they were always active found the enforced inactivity of early post-CABG recovery very frustrating
- Some participants said they were determined to get better and would do everything necessary to achieve it
- Determined people were also optimistic and positive that they would achieve a good recovery.

### 5.2.5 POST SURGERY

#### **After-care**

Participants were universally complimentary about the after-care provided by the hospital staff. These nurses would ring the patient a few days after discharge, also talk to their carer and provide any advice or support. Hospital staff were also available by telephone if patients and/or their carers had any queries or needed advice at any time.

*The [after-care] nurse was very good and if I'd got a query or if I was worried about something I would phone her and she'd give advice over the phone. 12M-159 Spouse*

This valued support was in stark contrast to that reportedly received from district nurses. Occasionally participants and their carers requested district nursing care to change the anti-embolic stockings or to check wounds were healing with no infection – a cause of anxiety for some participants and their carers. Of those participants needing this type of help everyone reported that the care was not available as often as required, if it was received at all, despite the intervention of the after-care team. This resulted in the General Practitioner

(GP) being called or the participants having to return to the hospital and thus early recovery was described as quite stressful at times, as participants did not report receiving the support they felt they needed.

*They said they'd come twice a week [to change the anti-embolic stockings]. I'm supposed to have them changed every day. "oh no, we'll come twice a week". 6M-107*

*Where they took a vein out, going septic. The doctor [at the hospital] said to call the district nurse and she wouldn't come, she was really nasty. So I got the nurse at the hospital to phone them and she says "they won't come out on my request". I thought that a bit bad really in that way. 6M-104*

Some participants reported that their GP practice called them in for a check-up after their surgery and regularly monitored their blood pressure and medication, although this was not provided to all participants.

*I have to have a check-up with the doctor [GP] so the doctor follows up everything, the GP, and she's very good. 12M-113*

*She hasn't called me in for anything, a couple of times I've been up for a blood test, apart from that nothing. 12M-104*

### **Social support**

Social support was provided from two sources, family and friends and peers at the rehabilitation classes. Family and friends provided practical support, particularly in the early stages of recovery when everyday activities were still difficult. Several participants felt they could not have coped on their own during this early phase. The participant who lived on his own had made alternative arrangements so that he had this support available and early recovery, whilst difficult, was manageable and did not cause him undue concern.

*I couldn't have managed on my own for the first two weeks, no chance, I just couldn't do anything. Of course the wife's been marvellous, made sure I was well looked after. 6M-107*

Emotional support was referred to explicitly by one participant who discussed its absence and his resulting depression.

*It's the company, they do say you're better in company because when you sit on your own a lot you do feel worse, don't you. I don't see my old friends, you see. I've not seen them since [surgery].*  
6M-111

The spouse of this last participant noted that the lack of friends meant her husband had no-one to talk to about his experiences, and no-one to demonstrate a positive recovery experience. This participant did not report a complete recovery at the twelve-month follow-up interview.

*We don't know anyone else in the same position he could talk to. If he could he'd have someone to talk to about it and think positive.*  
6M-111 Spouse

This last comment indicates a potential benefit of attendance at rehabilitation classes where other people who have undergone similar surgery can provide support, reassurance and understanding, benefits readily noted by those participants who attended the classes.

### **Rehabilitation classes**

A stated aim of the NSF is that supervised rehabilitation exercise classes, around ten to twelve in total, are offered to all post-CABG patients. Two participants reported not having been offered rehabilitation classes. It is not known what the circumstances were in these individual cases, it may be that participants did not recall being invited to the classes, or that these individuals were overlooked during the referral process.

Of the seven participants reported being offered rehabilitation classes, five attended. Although these classes are free and are recommended by the hospital, one participant did not want to attend, as he could see no additional benefits to his recovery and felt he was not the type of person to join in such groups, while the other felt the offer of classes was made too late to be of benefit to him.

*I didn't fancy it quite frankly. It meant a lot of time messing about talking to people about things they'd been given great long lists*

*about anyway. I'd got enough information as far as I could see. I'm not a joiner! 6M-135*

*Well it was about four months before they said to go and by that time I was feeling a lot better. 6M-229*

Participants who did take part in the classes reported that they were recommended by healthcare staff, whose comments influenced their decision to attend.

*I think you were a bit dubious of going and whether you could have done it but [surgeon] told you to go. 6M-104 - Spouse*

For these five participants who did attend, praise for the staff and the exercise classes was unanimous, with two main benefits identified. Other attendees in the classes provided a valued source of social support and reassurance; they had an understanding of what participants were going through and showed that recovery was an attainable goal.

*I could have done with it [rehabilitation classes] earlier on to talk to people about how I was getting on. I was talking to people that I hadn't realised had had it done and they said "I still get these pains three years on" and that was reassuring knowing that I wasn't the only one with it. 6M-229*

*You can see the people fit and joyful the way they were before surgery and that helped me enormously. 6M-242*

The spouses of two participants who reported not being offered rehabilitation identified that the lack of knowledge about what was appropriate activity was detrimental to their husbands' recovery and caused them some anxiety.

*You don't know how much he can do with his heart. You don't know what he can do. Knowing his limits, but we've got nobody to ask. 6M-111 Spouse*

*Any minute I think something's going to burst, I don't want him lifting heavy things. 12M-159 Spouse*

The main benefit reported by participants was the confidence to resume everyday activities that the supervised exercise classes gave. Prior to the exercise classes, several participants were reluctant to do many activities in

case they caused damage to their heart or the surgical wounds. Reassurance was provided by staff and other attendees and showed that it was safe for participants to resume their usual activities.

*I think the rehab helped because you knew how far you could go. Before then you were "do I dare do that or not?" you didn't want to push it in case it was no good for you.... I think before you go there you're frightened of what to do, you don't know what to do but when you get there they tell you how far you can go. So you think "I can do that, that's alright". Puts your mind at rest in one way. 6M-104*

Key points emerging from the person characteristics theme are presented in Box 6.

**Box 6: Post-surgery theme - key points**

- Participants valued the hospital after-care support and advice but district nursing care was insufficient
- Practical support was provided by family and friends in the early post-surgery phase
- Emotional support was also important; participants needing company to talk about their experiences and receive reassurance
- Other attendees at rehabilitation classes provided a positive recovery experience and peer support
- Rehabilitation classes also gave participants the confidence to resume everyday activities that previously they had been reluctant to undertake.

## **6 DISCUSSION**

Participants' comments illustrated a system of related barriers and facilitators to recovery after CABG and helped elaborate the processes by which these factors operate. The key results from this study are the exploration of possible mechanisms by which barriers and facilitators to recovery operate. Saturation

of themes was achieved at the six month interview stage. During the final twelve month follow-up interview, participants typically repeated comments made in earlier interviews. Only participants reporting they had not fully recovered at six months gave new information regarding their recovery experiences during the twelve month interview.

Little qualitative research has described the impact of the diagnosis and angina symptoms or the reasons for undergoing CABG. Whilst some participants in this study were aware they had a heart problem and reported severe limitations due to breathlessness and chest pain, many had attributed angina symptoms to indigestion and getting older and, as found in previous research (Lindsay *et al.*, 2000b; Screeche-Powell and Owen, 2003), described needing surgery as a shock. Participants identified regaining physical functioning and quality of life and necessity as reasons for having surgery. Participants revealed they felt they had 'no choice' as it was the only alternative to dying from a heart attack, an outcome emphasised by the consultant surgeon. In line with other research, waiting for CABG was described as a highly anxious time, as participants feared another heart attack (Fitzsimons *et al.*, 2000; Lindsay *et al.*, 2000b; Fitzsimons *et al.*, 2003; McCormick *et al.*, 2005), to which surgeons may have contributed with what participants described as a blunt prognosis. Waiting has also been associated with poorer social and physical functioning post-CABG (Sampalis *et al.*, 2001).

The disappointment and interruption of the emotional preparation for surgery due to cancellations (Ivarsson *et al.*, 2004), presence of post-operative sleep disturbances (Gardner *et al.*, 2005, Pierce *et al.*, 2004), the stressful experience reported by spouses visiting ITU (Engstrom and Soderberg, 2004), presence of post-operative loss of confidence (Rowe and King, 1998) long lasting post-operative chest pain and its impact on quality of life (Karlsson *et al.*, 1999) and the benefit to recovery of having perceived practical and emotional support (Blumenthal *et al.*, 2003; Okknen and Vanhanen, 2006), particularly reassurance and support from peers (Colella and King, 2004) have been noted in previous studies. All participants were complimentary about the treatment

and care provided by the surgical, nursing and rehabilitation teams. The after-care nurses were singled out for providing an appreciated source of support, advice and reassurance. However, participants reported that the service provided by district nursing teams was inadequate and forced participants to seek this care from the hospital or GP. Some participants reported supportive GPs who were proactive in offering follow-up support post-CABG, but this was not universal and some participants had outstanding queries regarding medication and the possibility of re-do CABG that could have been addressed by the GP practice.

Participants' anticipated recovery experience was based primarily on information provided by health professionals, peers and BHF booklets. In the main, the actual experience was as participants expected: an initial difficult period post-discharge with gradual improvements to almost complete recovery at two to three months post-CABG. A few participants felt they had made little progress at the six month follow-up interview and so their experience did not concur with that described, which was a source of considerable frustration and despondency. Whilst most participants' expectations of recovery were met, intervention from hospital and/or primary care staff might have helped prevent the severe despondency shown by two such participants in this study. A few participants, all of whom described themselves as anxious, noted areas where they felt they would have benefited from more information about recovery. Greater communication with these patients may have prevented their concerned interpretation of common post-CABG difficulties as a problem with the surgery. Two anxious participants, whose surgery had taken longer than usual, repeated at twelve months post-surgery their anxiety that surgeons had found a tumour during surgery but had not disclosed this information. Despite reassurances from nursing staff that the operation had gone well, a chance to speak to the surgeon and ask these questions directly may have been beneficial.

The impact of wound healing problems and chest wall discomfort on recovery are confirmed (Rowe and King, 1998; Anderson *et al.*, 1999; Theobald and



McMurray, 2004; Gardner *et al.*, 2005) and are discussed by participants in this study in terms of their impact on the recovery trajectory. In accord with previous work (Knoll and Johnson, 2000; Theobald and McMurray, 2004), participants in this study described recovery as being able to undertake normal activities without any chest pain or breathlessness. Participants, therefore, did not feel fully recovered from surgery until these wounds had healed and the tenderness from the chest bone being cut had greatly eased. Some participants felt fully recovered around three months post-surgery but others felt it took longer. An improvement was noticeable for most at three months, but full recovery took three to eight months longer with a couple of participants not feeling fully recovered at the time of the twelve month interview. A few participants described symptoms, in particular a weariness in their legs when walking, that they had only noticed after surgery. Although participants had brought this to the attention of their GP, none had received any confirmed diagnosis at the time of the twelve-month follow-up interview. Until participants received reassurance that this was not as a result of surgery or indicated another problem with their heart, participants did not feel fully recovered.

The link between trust in surgeons and post-operative recovery has been noted before (Higgins *et al.*, 2000). Comments from participants in this study have highlighted possible ways in which health professionals can build trust and confidence from patients and carers, a factor identified as important in patients' experiences of their care (Beinart *et al.*, 2003). Such trust can be engendered by being personable and friendly, by sharing a little information about themselves, and by appearing confident and relaxed about carrying out CABG.

Past research has identified a link between optimistic personality traits and better quality of life after cardiac events (King *et al.*, 1998; Scheier *et al.*, 1999; Beckie *et al.*, 2001; Shen *et al.*, 2004) with pessimism linked to poorer outcomes (Halpin and Barnett, 2003). However, evidence appears to point to a complex interaction with the influence of an optimistic personality on positive outcomes being mediated by coping strategies (King *et al.*, 1998; Ben-Zur *et al.*, 2000; Mahler and Kulik, 2000; Shen *et al.*, 2004; Bedi and Brown, 2005). The

findings from this study would tend to support this as participants described optimistic and positive characteristics associated with being determined to make a good recovery post-CABG and, therefore, to do everything necessary to achieve this goal, perhaps indicating a problem-focused coping strategy. Although personality traits were not formally assessed, comments from participants support those gathered in Phase 1 of this study and that of other work (Gardner *et al.*, 2005) and suggest further research into this relationship is necessary.

Findings revealed that person characteristics impacted on other aspects of patients' recovery. Rehabilitation class attendees who described themselves as anxious reported the main benefit was to give them confidence (an aim of rehabilitation classes as reported in the NSF, Department of Health, 2000a) to resume daily activities and thus to recover fully from the surgery. Previously, fear of causing damage to their heart or the surgical wounds prevented the resumption of everyday tasks, which reassurance and supervision from the rehabilitation class staff overcame and thus helped patients feel they had recovered from surgery. This finding adds to existing literature identifying the benefits of rehabilitation class attendance on quality of life (Knoll and Johnson, 2000; Muller-Nordhorn *et al.*, 2004; Theobald and McMurray, 2004) by reducing anxiety and (as found by Kennedy *et al.*, 2003) enabling women to perceive they can return to their normal activities. As also noted by anxious participants in this study, seeing peers in the rehabilitation classes was beneficial as it demonstrated that a good recovery is an attainable goal (Lindsay *et al.*, 2000b).

The findings from the interviews reported here have begun to describe the processes by which barriers and facilitators impact on recovery. Analysis of the interview data has also indicated a system of barriers and facilitators to recovery with direct and mediating relationships between factors. Developing a model of this network of recovery factors will aid health professionals in identifying those most at risk of a poorer outcome post-CABG.

## **6.1 LIMITATIONS**

It was disappointing not to recruit more women to this study. Every woman going onto the waiting list for CABG at University Hospital Coventry was approached to the interview study but some women declined to take part in an interview, although some of these did complete a questionnaire. No non-white British participants agreed to the interview component of the study. Following ethics committee guidelines participants were assured that they did not have to provide a reason for not taking part so it is not known why these people declined participation. It may be that people from under-represented ethnic groups have different experiences of recovery after CABG. An additional method of recruitment, such as targeted recruitment (Kennelly and Bowling, 2001), perhaps via community groups, may have resulted in greater participation in the study and this should be considered for future studies. While there was a range of ages among the interview participants only two people living alone were recruited (one of whom declined the follow-up interviews) who may have different recovery experiences, which could not be fully explored in this component of the study.

It must be acknowledged that there may be a self-selecting bias in the people who agreed to interview: that the people who participated are different from those that did not. Additionally, those who took part may have shared only particular experiences during the interview, so findings from this study may not represent a complete picture of recovery for these individuals.

Saturation of themes was achieved at the six month interview stage. During the final twelve month follow-up interview, participants typically repeated comments made in earlier interviews. Only participants reporting that they had not fully recovered at six months gave new information regarding their recovery experiences during the twelve month interview.

## **6.2 RELIABILITY AND VALIDITY**

Typically, qualitative studies require fewer participants (Arksey and Knight, 1999): although ten participants is typical in this type of research, views from

ethnic minority groups, women and those living alone were not fully represented. While traditional assessments of reliability and validity cannot be applied to qualitative research, this study aimed to meet, where applicable, the principles of “quality control” (Yardley, 2000). Many of the findings from this study concur with previous work, so giving confidence in the validity of the new findings emerging from the data.

### **6.3 SUMMARY**

Findings suggest a network of facilitators and barriers to recovery, highlighting the need for recovery to be taken as a multidimensional construct rather than considering individual components in isolation. These findings also indicate that components impact on each other so that components may be barriers or facilitators to recovery via direct and/or indirect mediating mechanisms. Some possible mechanisms by which barriers and facilitators to recovery operate have also been identified.

## Phase 2 – Predicting quality of life and perceived recovery

### 1 BACKGROUND

Findings from Phase 1 identified numerous barriers and facilitators to recovery including hospital ward experiences, person characteristics, availability of social support and attendance at rehabilitation classes, among others. It was also clear from this earlier research and the interviews undertaken as part of the Phase 2 data collection that participants considered recovery to be a combination of recovery from the physical aspects of surgery (wound healing and chest discomfort), a return to normal activities without angina symptoms and a better quality of life than prior to surgery. Phase 2 utilises a prospective longitudinal approach to investigate further these Phase 1 findings with a larger sample and identify the predictors of post-CABG perceived recovery.

### 2 AIMS

To investigate factors related to recovery after elective CABG in a longitudinal study from pre-surgery to one year post-surgery.

- Describe the pattern (and proportion) of quality of life and psychosocial variables along the recovery pathway
- Identify the proportion of patients that do not report an improved quality of life six and twelve months after elective CABG
- Identify the proportion of patients that do not report a complete perceived recovery six and twelve months after elective CABG
- Identify pre-surgical factors that predict quality of life and perceived recovery at six months post-surgery
- Develop a model of recovery after CABG.

### 3 METHOD

Please see *Chapter 3 Methodology (section 5.2)* for details on recruitment to this component of the study.

### 3.1 STUDY MATERIALS

The questionnaire (see Appendix 4) comprised the following scales and additional questions (see *Chapter 3 Methodology sections 3.3 - 3.9* for further detail of the study materials).

- Medical Outcome Study 36-item Short Form Health Survey (SF36)
- Hospital Anxiety and Depression Scale (HADS)
- Perceived Stress Scale (PSS)
- Life Orientation Test - Revised (LOT-R)
- Social support
- Self-efficacy
- Perceived recovery
- Attendance at rehabilitation exercise classes
- Whether surgery was felt to be worthwhile
- Demographic data - gender, age, marital status, education level and ethnicity.

## 4 ANALYSIS

### 4.1 DATA CLEANING

A random 10% of participants were selected by SPSS and their entered data checked for accuracy against the original questionnaires. The frequencies of all variables were also checked for out of range values. No errors were found, thus giving confidence that the remainder of the data were accurately entered.

## 4.2 ANALYSIS PLAN

### 4.2.1 RECODING

A few variables needed to be recoded to meet the requirements of the statistical tests carried out.

*Education* – as this is a categorical variable this was recoded into “no qualifications/left school before 16” and “educational qualifications” comprising all those reporting they had some academic qualifications.

*Rehabilitation* – this was recoded into “attended”, comprising participants who had completed or were still attending a rehabilitation course and “not attended”, comprising those who had not started a rehabilitation course yet, but intended to do so soon, those who did not wish to attend and those who reported they had not been offered a course.

*Perceived recovery* – the original four categories on the questionnaire “completely recovered”, “somewhat recovered” “not recovered” and “don’t know” were recoded into a dichotomous variable for use in the logistic regression. Thus, the variable was recoded into “complete recovery” comprising only those participants who reported they had completely recovered, and “not complete recovery” comprising those participants who reported they had recovered somewhat, not recovered or didn’t know.

*Variables not recoded* – the ordinal level data self-efficacy and change in health (from the SF36) variables were not recoded. Although parametric analysis requires interval level data, research indicates that using ordinal level data that represents an underlying continuous variable and is normally distributed is acceptable (Binder, 1984; Zumbo and Zimmerman, 1993; Jaccard and Wan, 1996). This practice is widespread within psychological research, although this issue is debated amongst statisticians (for example, Berry, 1993). Self-efficacy and change in health represent underlying continuous variables and are normally distributed; hence they were not recoded. The variable of social support was not normally distributed but, as it was not significantly correlated

with the outcome variables, was not used in any parametric analyses and thus did not need to be recoded.

#### 4.2.2 SIGNIFICANCE LEVEL

For correlation and regression analyses a significance level of  $p < 0.05$  was used as is common in much research. As several t-tests were carried out, thus increasing the risk of a Type 1 error, a more conservative significance level of  $p < 0.01$  was used for these tests.

#### 4.2.3 OUTCOME VARIABLES

As noted earlier (see *section 1 Background*), participants interviewed in Phases 1 and 2 regarded recovery from CABG as comprising several aspects: wound healing, resumption of daily activities without angina pain and improved quality of life. It would, therefore, be necessary to use several outcome measures to investigate predictors of recovery as no single measure included in the questionnaire could fully encapsulate the holistic nature of recovery that participants described in the interviews. The SF36 is a validated measure of quality of life and would enable predictors of that aspect of recovery to be assessed. However, the SF36 does not cover specific physical recovery from surgery, such as the wound healing and chest discomfort so commonly cited by participants in the interview components of this research as an important part of complete post-CABG recovery. Therefore the question “Do you feel you have recovered from your heart operation?” was also used as an outcome measure in analyses as this would give participants the opportunity to report on recovery as a whole. This single question has four response options (“complete”, “to some extent”, “no” and “don’t know”).

To meet the aim of developing a model of recovery, regression analyses were carried out to predict quality of life (using the SF36) and complete versus incomplete recovery at six months post-CABG. Considering findings from analyses with these outcome variables would enable the development of a fuller



picture of barriers and facilitators to perceived recovery at six months post-CABG, and thus suggest a possible model of recovery.

Further detail of the analyses carried out can be found below.

#### 4.2.4 DESCRIPTIVE ANALYSIS

Descriptive analyses were conducted on all variables at the three time points of pre-surgery (baseline), six and twelve months post-CABG, change over time scores calculated and the proportion of people reporting improvements or worsening on psychosocial variables identified. Chi square and t-tests were conducted on gender and age data of those taking part in the study and those declining in order to ascertain if the participants in the study were representative of the eligible participant population. At six months follow-up, analysis of responders and non-responders was carried out in terms of gender, age and baseline variables of anxiety, depression, optimism, quality of life and perceived stress. Few non-responders at twelve months follow-up prevented any similar analysis at this stage. In this study some of the chi square cells had an expected count of less than five. Although all cells in a chi square analysis should ideally have an expected count greater than five when looking at a 2x2 analysis "...this rule can be relaxed to allow one cell to have an expected value slightly lower than 5." (Altman, 1991, p253).

#### 4.2.5 CORRELATION ANALYSIS

Correlations were carried out between demographic (gender, age, educational qualifications or not), baseline variables (SF36 PCS, SF36 MCS, anxiety, depression, perceived stress, optimism, social support, change in health and self-efficacy), six month SF36 MCS and SF36 PCS, six month attendance at rehabilitation classes, six month perceived recovery (complete or not) and whether surgery was perceived as worthwhile at six months.

Although the majority of variables are interval level data, it was decided to use the Spearman's correlation in preference to Pearson's correlation as this is more appropriate when there are ordinal level variables. Although Kendall's tau

is preferred to Spearman's when many of the variables have the same rank data (Field 2005), this is not necessary when the data set is quite large. Generally effect sizes are interpreted using the Cohen (1988) criteria of 0.1 as a small effect, 0.3 a medium effect and 0.5 a large effect (explaining 1%, 9% and 25% of the total variance respectively) although Pett (1997) has suggested different correlations for categorical variables. Correlations above 0.8 are typically considered to indicate multicollinearity (Bryman and Cramer, 1990).

#### 4.2.6 MULTIPLE LINEAR REGRESSION

Multiple linear regression was carried out on the SF36 to identify predictors of quality of life six months post-CABG. The SF36 comprises two subscales - Mental Component Score (MCS) and Physical Component Score (PCS) - and was used as an indicator of recovery. However, as the developers of the SF36 do not suggest combining these two subscales (something which has not been done in past research, where other researchers conducted regression analyses on the two subscales separately, such as, Muller-Nordhorn *et al.*, 2004; Bradshaw *et al.*, 2006) it was necessary to carry out two analyses. This, however, increases the chance of Type 1 errors and means caution must be exercised when interpreting the results.

#### *Assumptions*

There are certain assumptions that must be met in linear regression (Field, 2005) including: all variables must be unbounded, independent, categorical or interval level data, no multicollinearity between predictor variables, homoscedasticity, normally distributed uncorrelated errors (Durbin-Waston statistic should be close to 2) and linearity between the outcome variable and the predictors. Field (2005) suggests multicollinearity is indicated by correlations of over 0.8 or 0.9 but variance inflation factor (VIF) and Tolerance data were also considered when determining if predictor variables violated this assumption.

### Method

There are several methods of regression and no definitive answers as to the best approach to take. As the outcome measures (SF36 MCS and PCS) were also assessed at baseline, it was decided to control for these in the analysis. A hierarchical method was used as this would allow assessment of increment in  $R^2$  change between a model produced with the baseline outcome variables (either SF36 MCS or SF36 PCS) and further models following the addition of other independent variables. The backward method of variable elimination (as also used in previous research, for example, Bradshaw *et al.*, 2006) was chosen in preference to a forward or mixed stepwise regression method. This backward method would enable the most parsimonious model possible to be developed by eliminating variables one at a time until all variables in the equation were of a pre-designated significance level of  $p < 0.05$  (a level used in other research such as Bradshaw *et al.*, 2006). Whilst some researchers argue that only those independent variables that correlate with the outcome measure should be included, others suggest including all variables as there may be inter-relationships between them that would otherwise be obscured (Altman, 1991). Given the difficulties in recruiting participants to the study, sample size was small and so it was not possible to use all measured variables in the regression analyses. Therefore, only those variables significantly correlated with the outcome variables were included in the regression.

### Sample size

There are numerous formulae for calculating the required number of participants although no consensus on the superiority of any one (Altman, 1991). Some suggest a 'rule of thumb' of approximately ten participants to each predictor variable. However, Jaccard and Wan (1996) found, from their review of the literature, that some researchers recommend only five participants per variable. Sample size in this study was severely constrained by the difficulties in recruiting participants (see *Chapter 3 Methodology, section 5.2* for details) so it was decided, using more conservative estimates of sample size, to limit the

variables for inclusion to a maximum of ten. This was done by using only those variables that were significantly correlated with the outcome variables.

### *Procedure*

Scatter graphs of interval level data predictor variables against the outcome variables were inspected visually to ensure linearity. The regression was then carried out with each outcome variable in turn. Backward elimination of variables was applied whereby variables with the least significance to the model were eliminated in turn and the regression run again until all variables contributed significantly to the model at the level of  $p < 0.05$ .

## 4.2.7 LOGISTIC REGRESSION ANALYSIS

Perceived recovery was recoded into the dichotomous variable required for this test of complete recovery or not complete recovery. As with linear regression (see *Section 4.2.6*) there are various methods that can be used but, as there was no baseline measure of perceived recovery to be accounted for in the logistic regression model, all variables were included using the forced entry approach with backward elimination. The issue of sample size meant that only those variables significantly correlated with perceived recovery were included in the regression. As with linear regression, the data must show no multicollinearity amongst predictor variables.

## 5 RESULTS

### 5.1 RECRUITMENT

See Figure 1 for details of participant recruitment numbers.

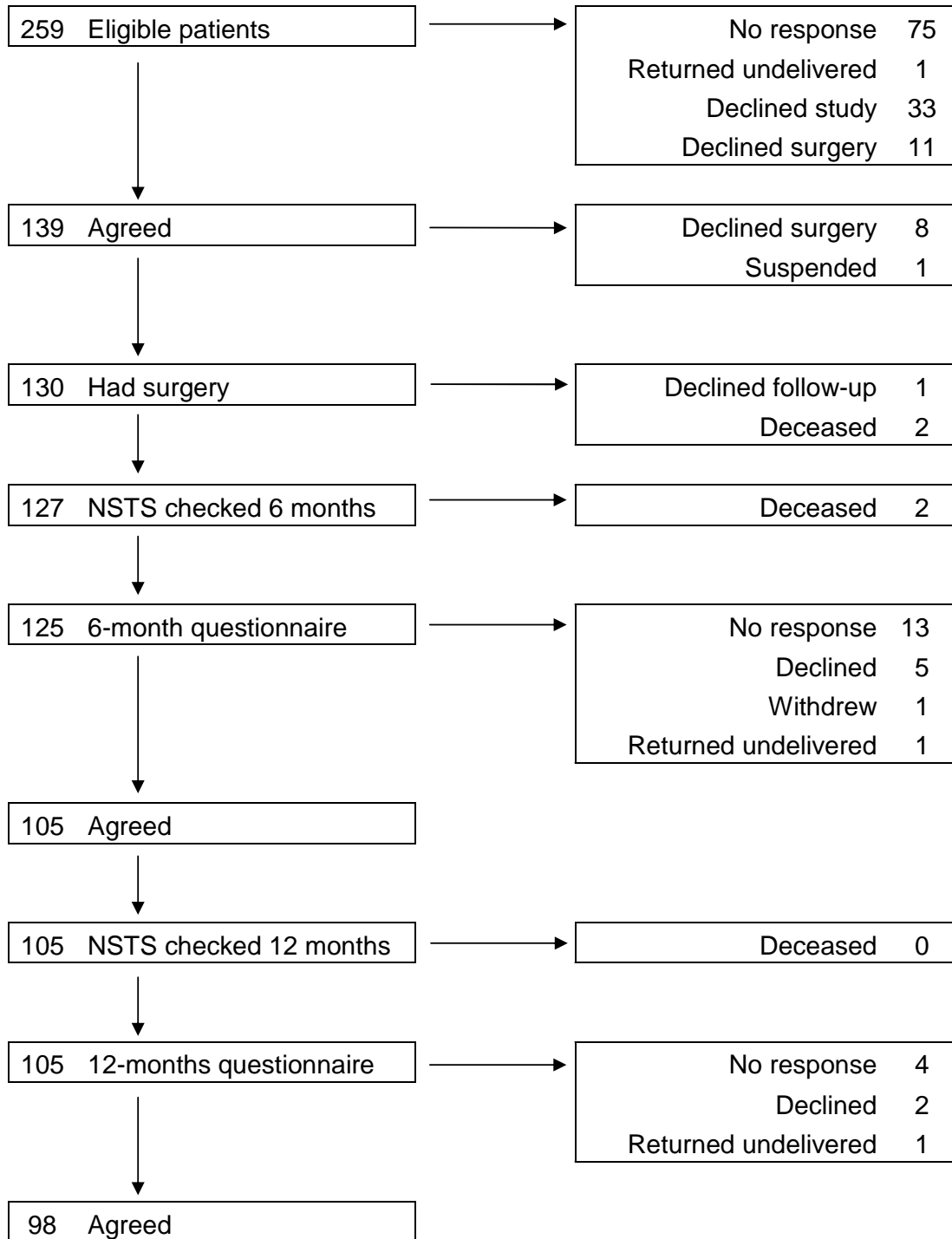
Across both recruitment sites a total of 259 patients were approached to take part in this study. Of these, one questionnaire was returned undelivered by Royal Mail, 11 patients declined surgery without consenting to the study, there was no response from 72 patients, and 32 patients declined to take part in the study. In total 139 patients returned completed questionnaires, an adjusted

response rate of 56.3%. Of those who agreed to take part in the study and returned a baseline questionnaire, eight subsequently decided not to undergo CABG (two chose Percutaneous Coronary Intervention (PCI) instead but the treatment decisions of the remaining six are not known) and one was suspended from surgery pending further investigations (and had not had surgery by the time recruitment finished at the end of August 2006).

A total of 130 participants went on to have surgery although one of these patients did not return a completed consent form and so was considered to have declined further participation in the study. A further two participants are known to have died shortly after surgery (cause of death is not known). Hospital staff accessed hospital records and/or the National Strategic Tracing Service (NSTS) to identify if any of the remaining 127 patients were deceased. These checks revealed two participants to have died so six month follow-up questionnaires were sent to the remaining 125.

Complete six-month follow-up questionnaires were received from 84% (n=105), five declined, one withdrew, one was returned undelivered by Royal Mail and there was no response from the remaining 10.4% (n=13). At twelve months post-surgery, NSTS and/or hospital records were checked for 105 participants, with none identified as having died at some point during the preceding six months. Of the 105 twelve-month follow-up questionnaires sent out, one was returned undelivered. Of the remaining 104 questionnaires sent out 94.2% (n=98) were returned complete with no response from 3.8% (n=4) and 2% (n=2) returned blank. In summary, full data (i.e., all three questionnaires returned completed) was available for 98 participants.

Figure 1: Participant recruitment



At all three time-points reminders were sent to non-responders two to three weeks after the initial mail out. The sending of reminders increased the response rate from 45.8% to 56.3% at baseline, from 75.2% to 84% at six-month follow-up and from 76.9% to 94.2% at twelve-month follow up, showing the use of reminders was a valuable method of increasing the response rate. Participants were considered to have responded to the reminder if their questionnaire was received five days or more after the reminder was posted.

## 5.2 NON-PARTICIPANTS

Basic demographic details of people agreeing and not agreeing to take part in the study were compared (excluding those patients who declined surgery without completing a questionnaire and the patient whose questionnaire was returned undelivered, as these patients were no longer eligible for the study). A chi square analysis showed a significant association between gender and uptake of the study  $\chi^2(1)=5.39$ ,  $p=0.02$  with almost two-thirds of men approached (59.7%) agreeing to take part compared to 41.3% of women approached. The mean age of those agreeing to take part in the study was 66 years (standard deviation (S.D.) = 9.43) compared to 64 years for those not taking part, a difference that was not significant ( $t(249)=1.366$ ,  $p=0.165$ ).

## 5.3 NON-RESPONDERS

### *Six months post-surgery*

At six months post-surgery 105 participants completed the questionnaire, 19 declined or did not respond (this excludes those participants who died in the intervening period and the one questionnaire that was returned undelivered by Royal Mail). There was a significant association between gender and response:  $\chi^2(1)=5.058$ ,  $p=0.025$ , with 87.3% ( $n=96$ ) of men and 64.3% ( $n=9$ ) of women completing the questionnaire. T-tests between baseline variables and response showed some significant differences between responders and non-responders (see Table 1 for details). With the stricter  $p<0.01$  significance level applied to the multiple t-tests, only baseline SF36 MCS and perceived stress were

significantly different between responders and non-responders at six months, with non-responders having lower mental well-being and greater perceived stress at baseline. Although not reaching the stricter significance level, the data also suggests a trend that non-responders at six months had greater depression and anxiety and were younger than responders. These results mean that the regression models carried out later to predict quality of life and perceived recovery are based on the less anxious patients in the sample and thus the model may not be generalisable to all patients, as different predictors of outcome may be relevant to more anxious patients.

*Table 1: Mean score of baseline variables by response and t-test data*

	Response / Mean (S.D.)		Independent t-test		
	Responders	Non-responders	t*	df	Sig (2-tailed)
Age at baseline (n=124)	66.4 (9.1)	61.4 (8.2)	2.215	122	0.029
Baseline SF36 MCS** (n=116)	47.5 (11.5)	38.1 (9.8)	3.083	114	0.003
Baseline SF36 PCS** (n=116)	31.6 (11.4)	26.5 (9.8)	1.677	114	0.096
Baseline PSS (n=124)	15.1 (7.9)	21.1 (7.6)	-3.010	122	0.003
Baseline anxiety (n=123)	6.8 (4.4)	9.3 (4.9)	-2.215	121	0.029
Baseline depression (n=123)	5.7 (4.0)	8.2 (4.3)	-2.369	121	0.019
Baseline Optimism (n=123)	14.7 (4.7)	13.6 (4.2)	0.990	121	0.324

\* The Levene's test for equality of variances was not significant for any of the variables.

\*\* MCS= Mental Component Score, PCS= physical component score.



*Twelve months post-surgery*

At twelve months post-surgery just six participants did not respond so no analysis was carried out on responders and non-responders at this stage. A visual inspection of the data showed no obvious differences between the groups.

**5.4 PARTICIPANTS**

Demographic details of the 139 participants completing baseline questionnaires are presented in Table 2. The majority of participants were male, almost all reported their ethnic origin as White British or European and over 70% were married or living with a partner. Over half the participants had no qualifications or had left school before sixteen years of age. The mean age of participants was 66 years (S.D. = 9.427) with a range between 40 and 84 years.

*Table 2: Demographic details of participants pre-CABG*

Demographic		Percent*	N
Gender (n=139)	Male	86.3	120
	Female	13.7	19
Ethnic Origin (n=138)	White British or European	97.1	135
	Asian or Asian British	2.2	3
Marital status (n= 139)	Single	5.8	8
	Separated	0.7	1
	Married	69.8	97
	Divorced	6.5	9
	Living with partner	3.6	5
	Widowed	13.7	19
Education level (n= 133)	Left school before 16 years or none	54.7	76
	O-level or GCSE or equivalent	16.5	23
	A-level or BTEC or equivalent	15.8	22
	University degree	5.0	7
	Post graduate qualification	3.6	5

\* Where figures do not equal 100%, this is due to missing data

A summary of the recruitment, non-responders and participant characteristics can be found in Box 1.

*Box 1: Recruitment and sample characteristics key points*

- Study uptake 56.3% (adjusted response rate), 98 participants completed all three questionnaires
- Women were less likely to take part in the study and less likely to complete follow-up questionnaires than men
- People who took part in the study but did not complete follow-up questionnaires had poorer baseline (pre-CABG) mental well-being and greater perceived stress than those who did complete follow-up questionnaires
- People who took part in the study were predominantly male, white British, married and had no formal educational qualifications.

## 5.5 FINDINGS

T-tests were carried out on all baseline variables to look for differences between men and women. Only perceived stress was significantly different between the groups. As perceived stress was not included in any regression analyses it was decided to include all the women in subsequent analyses.

### 5.5.1 CORRELATIONS

Only a few of the significant correlations will be detailed here; the matrix showing all correlations can be found in Appendix 7. A Pearson's correlation was also run on all interval level variables but differences in coefficients were small and there were no differences in variables that were significantly correlated with six month post-surgery SF36 MCS and SF36 PCS so only the Spearman's correlation data is reported here.

Older people were less likely to have attended rehabilitation classes ( $r_s=.313$ ,  $p=0.001$ ) although attendance was weakly associated with better physical well-being (SF36-PCS) at six months post-CABG ( $r_s=-.254$ ,  $p=0.011$ ). Correlation coefficients indicated that a worsening in health over the past year (change in health as measured by the SF36) was associated with higher perceived stress, anxiety, depression and lower optimism. Correlations between the baseline psychosocial variables showed higher self-efficacy was moderately associated with lower anxiety, depression and perceived stress, higher optimism and better mental well-being (SF26 MCS) at the one percent significance level.

Perceived recovery was associated with whether surgery was perceived to be worthwhile ( $r_s=.423$ ,  $p=0.009$ ) and with self-efficacy ( $r_s=-.367$ ,  $p=0.001$ ) and other baseline variables. Perceived recovery was also correlated with six month post-CABG mental and physical well-being (SF36 MCS and PCS) but the coefficients were not so high as to indicate duplication among these variables. Such multicollinearity was, however, indicated by the expected very high correlations between perceived stress and the variables baseline mental well-being ( $r_s=-.811$ ,  $p=0.001$ ), baseline anxiety ( $r_s=.739$ ,  $p=0.001$ ) and baseline depression ( $r_s=.739$ ,  $p=0.001$ ).

The demographic and baseline variables significantly correlated in the expected direction with six month SF36 PCS were: SF36 PCS, SF36 MCS, education, change in health, perceived stress, anxiety, depression, optimism, self-efficacy and attendance at rehabilitation. Those demographic and baseline variables significantly correlated with six month SF36 MCS were: SF36 PCS, SF36 MCS, age, change in health, perceived stress, anxiety, depression, optimism and self-efficacy.

### 5.5.2 QUESTIONNAIRE – PSYCHOSOCIAL VARIABLES

This section reports on findings related to the previously stated aim to describe the pattern of psychosocial functioning along the surgical pathway.

As tests comparing responders and non-responders to the six month questionnaire showed significant differences on several psychosocial variables, only participants completing both baseline and six month follow-up questionnaires were included in these analyses to ensure that comparisons of pre- and post-surgery data were not skewed by inclusion of six month follow-up non-responders.

Mean pre-surgery anxiety score was slightly lower than previously published figures (6.8, S.D. 4.4) although the mean baseline depression score (5.7, S.D. 4.0) was similar (Ellard *et al.*, 2006), with both figures decreasing at six months post-surgery but changed little between six and twelve months. Baseline PSS scores at 15.1 (S.D. 7.9) were higher than the general population norm (Cohen and Williamson, 1988) but similar to recent findings from a UK study of patients awaiting CABG (Ellard *et al.*, 2006) and decreased to 11.7 (S.D. 8.7) six months after surgery (i.e. lower than the general population norm). Data for levels of baseline optimism in this study at 14.7 (S.D. 4.7) are similar to norms for patients awaiting CABG in the US (men 15.25, S.D. 4.09; women 14.92, S.D. 3.97) and changed very little over time. Table 3 shows the mean scores for baseline and six and twelve month follow-up psychosocial variables.

*Table 3: Mean psychosocial variable scores*

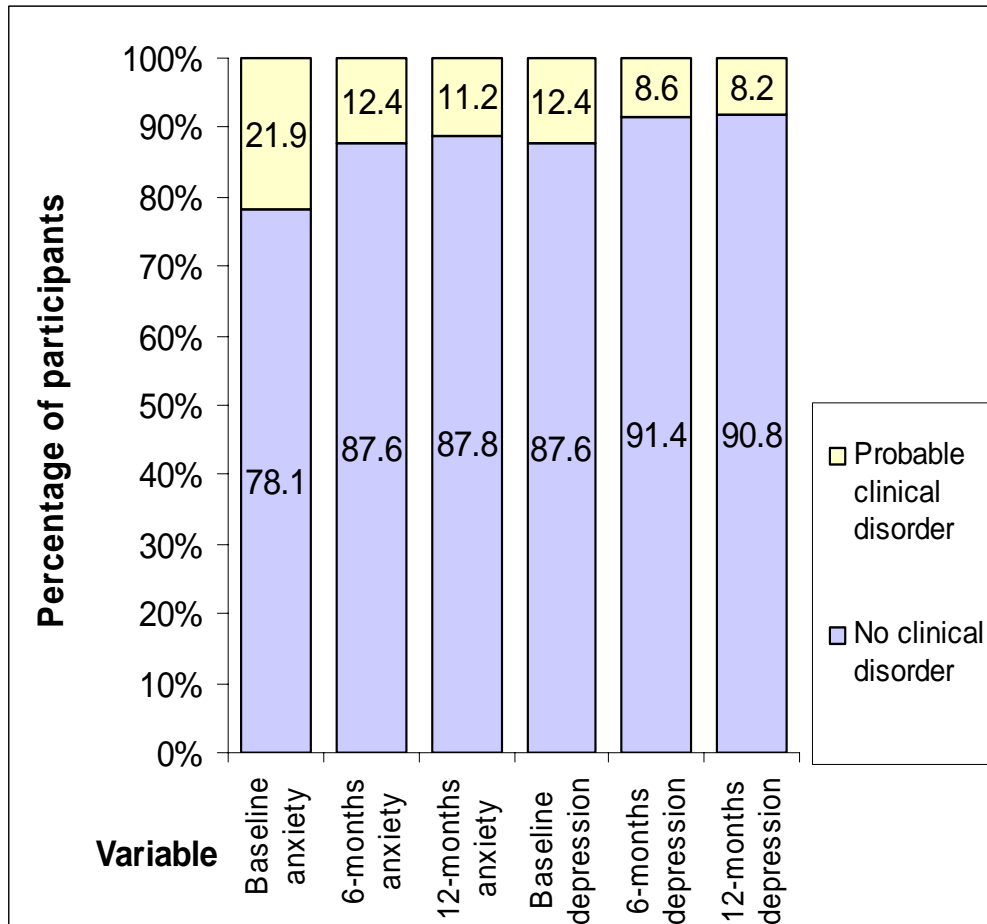
Measure	Baseline	6 months	12 months
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Perceived stress (PSS)	15.1 (7.9)	11.7 (8.7)	11.4 (7.5)
Anxiety (HADS)	6.8 (4.4)	5.3 (4.5)	5.2 (4.0)
Depression (HADS)	5.7 (4.0)	3.9 (4.2)	4.0 (4.1)
Optimism (LOT-R)	14.7 (4.7)	15.0 (5.0)	15.0 (4.7)

At baseline (pre-surgery) 33.0% (n=34) of respondents were 'not at all' or only 'somewhat' confident that they could manage their heart condition, which decreased to 22.1% (n=23) at six months post-surgery and decreased slightly more to 19.8% at twelve months post-CABG. Pre-surgery, around two thirds of participants (68.8%) reported that someone was available to help them if they

needed or wanted help quite a bit or as much as they wanted, a figure that changed little post-CABG.

Almost a quarter (21.9%, n=23) of respondents had pre-surgery HADS anxiety scores indicating probable clinical disorder and 12.4% (n=13) had HADS depression scores above the probable clinical disorder cut-off point of 11, both proportions being higher than UK general population norms (Crawford *et al.*, 2001). The proportion of participants with probable clinical anxiety and depression decreased to just under 13% and 9% respectively post-surgery with little change between six and twelve months post-surgery (see Figure 2). HADS scores are relevant to recovery in several ways; people who are very anxious and/or depressed may not feel recovered, anxiety and depression impact on perceived quality of life and hence on recovery given that improved quality of life is a goal of CABG and anxiety/depression may have mediation effects and affect other factors, social support for example, and impact on recovery indirectly.

Figure 2: Percentage of participants showing probable clinical anxiety/depression



*Rehabilitation class attendance*

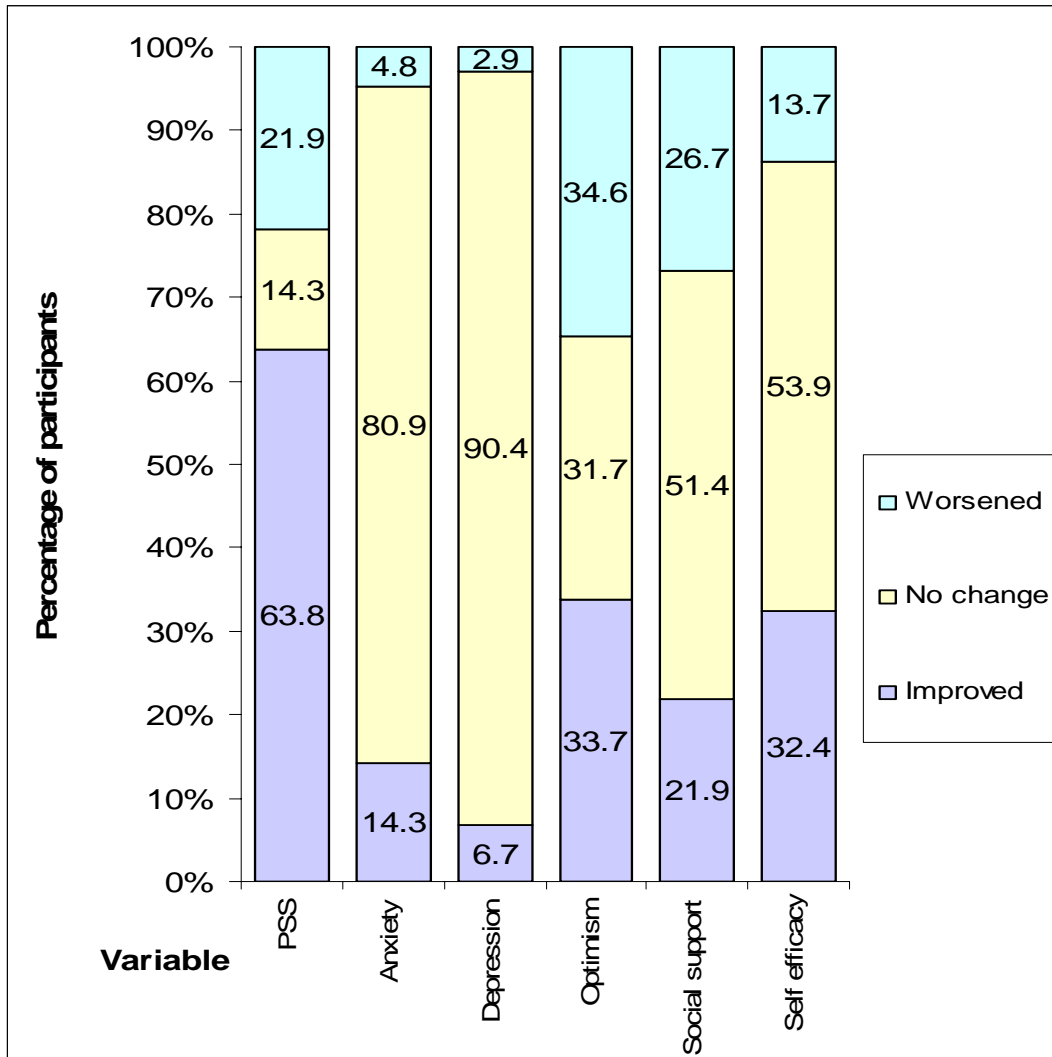
Almost half (46.7%) of the participants had completed a cardiac rehabilitation programme with a further 16% still attending. A few participants reported they were starting a rehabilitation programme soon but almost 30% stated they did not wish to attend. Five participants wrote comments beside the question to indicate that they had not been offered the opportunity to attend a programme.

### *Change over time*

With the exception of perceived social support and optimism, which remained stable, mean six month scores showed an improvement compared to baseline scores (i.e., at six months post-surgery participants reported decreased anxiety, depression and perceived stress). However, while participants showed overall improvements, individual change scores indicate a substantial number of participants who reported a worsening situation, although this decline on the perceived stress, optimism, social support and self-efficacy variables may not have been very large and thus may not represent a substantive clinical change (data indicating clinically significant changes are not published for these variables). Figure 3 shows the percentage of participants who reported an improvement, worsening or no change across time from baseline to six months post-surgery.

HADS improvement scores represent those participants who had possible clinical disorder at baseline but whose scores decreased to below this threshold at follow-up, worsening scores represent those participants whose scores increased to bring them above the possible clinical disorder threshold post-CABG. As no data on clinically significant threshold scores were available for the other variables, improvement/worsening scores for perceived stress, optimism, social support and self-efficacy represent an increase/decrease of 10% or more from the original score, and no change represents a change of less than 10% from the original score.

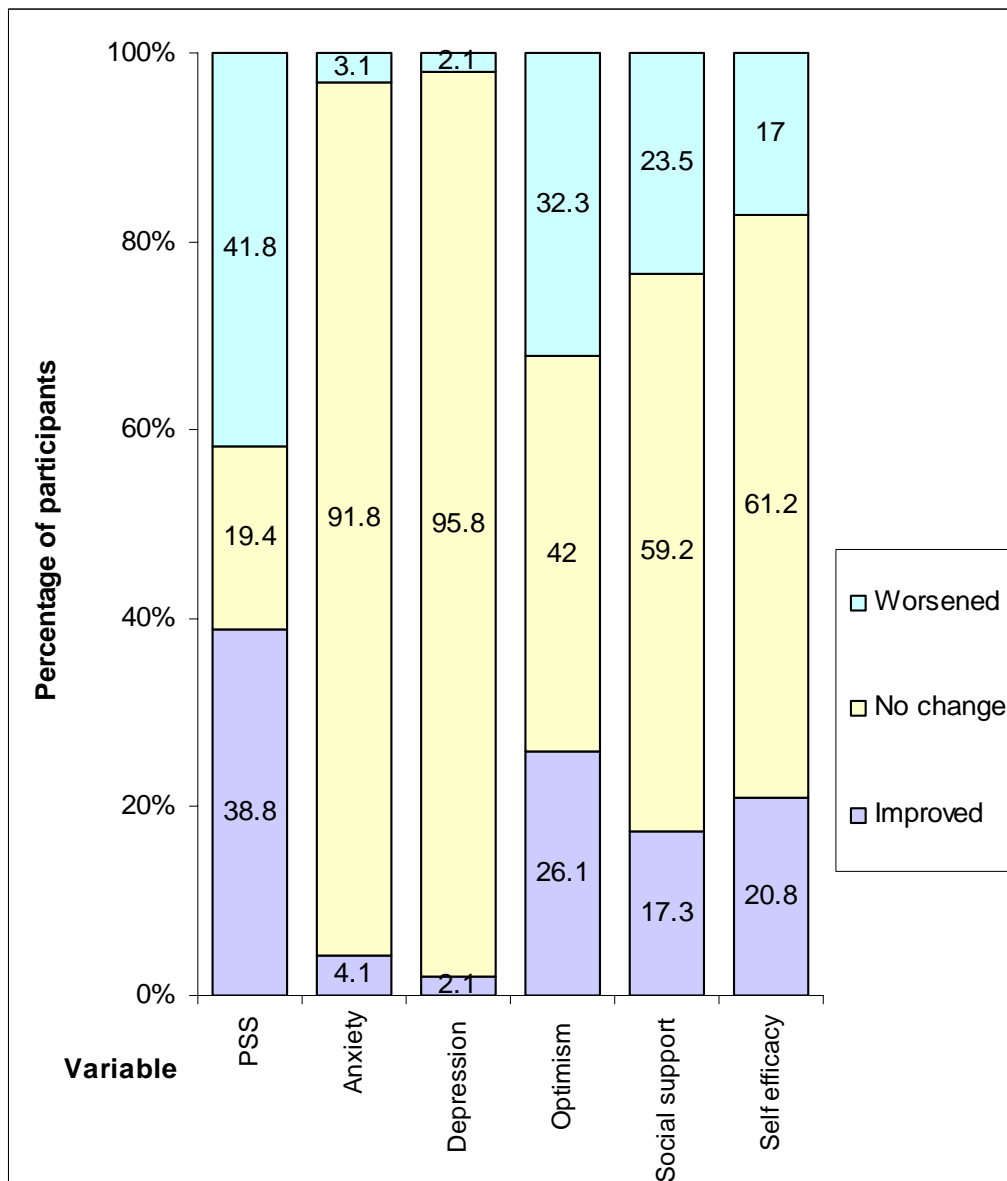
Figure 3: Psychosocial variables change from baseline to six months post-CABG





At twelve months a similar pattern emerged with the majority of people reporting no change in anxiety and depression from six to twelve months. Other scores changed somewhat more, although these changes may not be clinically significant. Figure 4 shows the percentage of participants who reported an improvement, worsening or no change across time from six to twelve month post-CABG.

Figure 4: Psychosocial variables change from six to twelve months post-CABG



### *Psychosocial variables summary*

A summary of the key findings around psychosocial variables can be found in Box 2.

Findings in this section show the pattern of psychosocial functioning along the surgical pathway, which appears to be an overall improvement at six and twelve months post-surgery compared to pre-CABG levels. Prior to surgery, participants' mean scores showed quite high levels of anxiety, depression and perceived stress, all of which decreased at six months after surgery. However, there was no evidence of a further substantial decrease in mean scores at twelve months post-surgery compared to the six month scores suggesting that for many people psychosocial functioning improves by six months post-surgery and changes little after that time. Whilst overall scores improved post-surgery, the data show that for some people the pattern of psychosocial functioning is quite different with some experiencing a worsening situation after surgery compared to pre-CABG. There was little change in overall social support, optimism and self-efficacy mean scores from pre- to post-surgery, although there were a substantial number of participants who showed a worsening situation after surgery. Almost a third of participants did not wish to attend an exercise rehabilitation class, although the majority had or were currently attending.

*Box 2: Psychosocial variables key points*

- Mean anxiety, depression and perceived stress scores improved from pre- to six months post-surgery
- No change in mean social support, optimism and self-efficacy scores between pre- and post-surgery
- No change in mean scores between six and twelve months post-surgery
- The majority of participants attended rehabilitation classes but almost a third stated they did not wish to attend
- Individual change over time scores showed a substantial proportion of people who reported worsening psychosocial functioning post-surgery compared to pre-surgery.

### 5.5.3 QUESTIONNAIRE – QUALITY OF LIFE

This section reports on findings related to the previously stated aim to identify the proportion of patients that do not report an improved quality of life post-CABG.

As tests comparing responders and non-responders to the six month questionnaire showed significant differences on several psychosocial variables, only participants completing both baseline and six month follow-up questionnaires were included in these analyses to ensure that comparisons of pre- and post-surgery data were not skewed by inclusion of six month follow-up non-responders.

Mean scores of the eight norm-based subscales are shown in Table 4. These show improvements from pre- to post-surgery, although improvements from six to twelve months after CABG are very small. At baseline, the mean SF36 PCS was 31.6 (S.D. 11.4), which increased post-surgery but remained much lower than the UK general population norm (Jenkinson *et al.*, 1999) with most patients

having scores indicating below average physical functioning both at six (81.6%) and twelve months (78.5%) after surgery. Mean baseline MCS was, at 47.5 (S.D. 11.5), similar to UK general population norms (Jenkinson *et al.*, 1999). This also increased after CABG with 54.2% having scores indicating below average mental well-being prior to surgery, decreasing to 31.6% six months after CABG (30.1% at twelve months post-CABG).

Prior to CABG, the majority (66.7%, n=70) of people rated their health in general as “somewhat” or “much worse” than one year ago, with 29.5% (n=31) reporting it was “about the same” as one year ago. This compares to the improvement at six months post surgery where almost three quarters (75.2%) of people rated their health in general as “somewhat better” or “much better” than one year ago. However, 14.3% reported their health was “somewhat worse” or “much worse” than one year ago, which declined to 9.2% at twelve months.

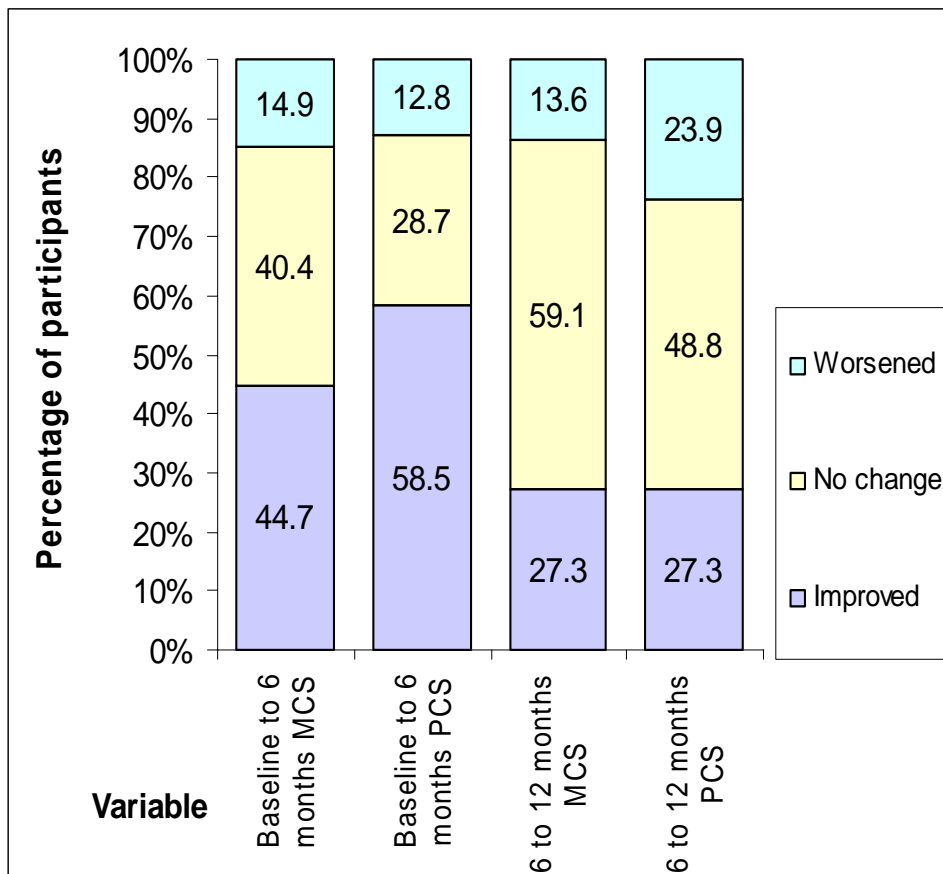
*Table 4: Mean SF36 sub-scale scores*

Subscale	Baseline Mean (S.D.)	6 months Mean (S.D.)	12 months Mean (S.D.)
Physical functioning	30.4 (13.3)	41.1 (12.9)	41.2 (13.4)
Bodily pain	40.1 (10.6)	46.0 (11.6)	46.8 (11.2)
General health	41.8 (10.2)	46.9 (11.4)	47.8 (11.3)
Vitality	40.4 (11.8)	49.0 (10.6)	49.5 (11.5)
Social functioning	41.1 (13.2)	48.4 (11.4)	49.7 (12.0)
Role emotional	40.0 (14.8)	44.7 (14.1)	45.1 (13.5)
Mental health	46.6 (11.5)	50.9 (12.1)	53.1 (10.4)
Role functioning	30.6 (13.7)	38.2 (13.4)	41.0 (12.3)
Physical Component Score	31.6 (11.4)	39.9 (11.3)	40.8 (11.5)
Mental Component Score	47.5 (11.5)	52.1 (11.0)	52.8 (10.8)

*Change over time*

At six months post-surgery participants reported an increase in physical functioning and mental health. However, while overall participants showed improvements, individual change scores indicate a substantial number of participants who reported a worsening situation. Figure 5 shows the percentage of participants who reported an improvement, worsening or no change across time. Using the same criteria as other researchers (Pirraglia *et al.*, 2002; Hawkes and Mortensen, 2006), SF36 scores represent a clinically significant improvement if scores increased by five or more, a clinically significant decline if scores decreased by five or more or no change if scores changed by less than five.

*Figure 5: Change across time – quality of life*



SF36 scores show an improvement from pre- to six months post-surgery for around half of participants, although scores show a worsening in mental and physical health for just under 15% of participants. The change in scores from 6 to 12 months show around 30% of participants reporting an increase in quality of life, with the majority indicating no change, although there is a substantial percentage of people whose mental and physical health in particular has worsened over the previous 6 months.

### *Quality of life summary*

A summary of the key findings around quality of life can be found in Box 3.

Findings in this section show the pattern of quality of life along the surgical pathway, which appears to be an overall improvement at twelve months post-surgery compared to pre-CABG levels. Prior to surgery, participants' mean scores showed quite poor physical component scores, unsurprising given their age and need for surgery. Although improving at six months post-surgery, scores were still lower than general population norms. Mental component summary scores were similar to general population prior to surgery but also improved six months after CABG. Neither component score increased substantially from six to twelve months suggesting that the majority of the improvement in quality of life occurred in the first six months of recovery.

Looking at individual scores shows that whilst the majority show an improvement from pre- to six months post-surgery over 12% of participants report a worsening quality of life after CABG with a similar percentage again reporting a worsening quality of life at twelve months post-surgery compared to six months post-CABG. Prior to surgery the majority of participants rated their health as worse than twelve months previously: at six months post-CABG the majority rated their health as better than 1 year previously showing a positive change in health after surgery. However, over 14% of participants said their health was worse six months after surgery compared to before CABG.

*Box 3: Quality of life key points*

- Mean quality of life scores improved from pre- to six months post-surgery
- Little change in mean quality of life scores between six and twelve months post-surgery
- Individual change over time scores showed a substantial proportion of people who reported worsening quality of life post-surgery compared to pre-surgery
- Whilst the majority of participants reported their health as better after CABG than before over 14% said their health was worse.

*Predicting quality of life*

One of the aims of the study was to identify factors that could predict quality of life six months post-surgery. As the aim is to also provide information that is clinically useful to health professionals, it was decided to investigate only which pre-surgical variables were predictive of outcome, as these are the only variables that would be available to staff prior to surgery and thus the only variables they could use to identify a patient at risk of poorer post-CABG recovery.

Scatter graphs indicated linear relationships between the dependent and independent variables. Multiple linear regressions were carried out to identify the variables that predict 6 month post-surgery SF36 MCS and SF36 PCS. Due to the limited sample size, only the variables that were significantly correlated with the outcome measure were included (see *Correlations section 5.5.2* for details). As the Spearman's correlation reported earlier indicated multicollinearity between perceived stress and baseline SF36 MCS, the former was not included among the predictor variables.

### *Mental well-being*

The initial model accounted for 60% (adjusted  $R^2 = .567$ ) of the variance. A table of the coefficients at each step of this first model can be found in Appendix 8 (Table A1). The least significant variable was then eliminated from the second analysis, and then the next least significant variable from the following analysis. This process was continued until a model was produced in which all variables were statistically significant at the  $p < .05$  level. The variables that were eliminated, in order of removal, were: baseline SF36 PCS, baseline anxiety, change in health, baseline optimism. The final model, shown below in Table 5, accounts for 58% of the variance (adjusted  $R^2 = .566$ ,  $p = 0.001$ ) and includes the variables: baseline SF36 MCS, age, baseline self-efficacy and baseline depression.

The assumptions noted earlier (*Section 4.2.6*) were assessed and the model appears to be accurate for the sample and generalisable to the population. Perceived stress was removed from the analysis as the correlation coefficient with other predictor variables was very high. In the final model, no VIF was larger than 10, the average VIF was not substantively larger than 1 and no tolerance figures were below .2 suggesting there is no multicollinearity in the data. Only 1 case had a standardised residual of greater than  $\pm 2$  and the Durbin-Watson test was 1.883 indicating that the residual errors were uncorrelated. The histogram and probability plot indicated normally distributed residuals and consideration of the partial plots indicated homoscedasticity.



Table 5: Final model of predictors of 6 months post-CABG SF36 MCS

Model	B*	Std. Error	t	Sig.**	Partial correlation	Part correlation
<b>Step 1</b> ( $R^2 = .45$ , $p < .01$ )						
Constant	21.700	3.626	5.984	.001		
Baseline SF-36 MCS	.641	.074	8.629	.001	.669	.669
<b>Step 2</b> ( $R^2 = .50$ , $p < .01$ )						
Constant	2.730	6.869	.397	.692		
Baseline SF-36 MCS	.628	.071	8.853	.001	.680	.654
Age	.294	.092	3.196	.002	.318	.236
<b>Step 3</b> ( $R^2 = .58$ , $p < .01$ )						
Constant	16.166	8.668	1.865	.065		
Baseline SF-36 MCS	.341	.099	3.458	.001	.344	.236
Age	.261	.085	3.054	.003	.308	.209
Self-efficacy	2.411	.985	2.447	.016	.251	.167
Baseline Depression	-.807	.283	-2.855	.005	-.290	-.195

\*Beta values quoted are the un-standardised coefficients \*\* significance correct to 3 decimal places

### Physical health

The initial model accounted for 50% (adjusted  $R^2 = .445$ ) of the variance. A table of the coefficients at each step of the model can be found in Appendix 8 (Table A2).

The least significant variable was then eliminated from the second analysis, and then the next least significant variable from the following analysis. This process was continued until a model was produced in which all variables were statistically significant at the  $p < .05$  level. The variables that were eliminated, in order of removal, were: education, attendance at rehabilitation classes, change in health, baseline anxiety and baseline optimism. The final model, shown below in Table 6, accounts for 47% of the variance (adjusted  $R^2 = .441$ ,  $p = 0.001$ ) and includes the baseline variables; SF36 PCS, SF36 MCS, self-efficacy and depression.

The assumptions noted earlier (*Section 4.2.6*) were assessed and the model appears to be accurate for the sample and generalisable to the population. Perceived stress was removed from the analysis as the correlation coefficient with other predictor variables was very high. In the final model, no VIF was larger than 10, the average VIF was not substantively larger than 1 and no tolerance figures were below .2 suggesting there is no multicollinearity in the data. No cases had a standardised residual of greater than  $\pm 2$  and the Durbin-Watson test was 2.018 indicating that the residual errors were uncorrelated. The histogram and probability plot indicated normally distributed residuals and consideration of the partial plots indicated homoscedasticity.

*Table 6: Final model of predictors of 6 months post-CABG SF36 PCS*

Model	B*	Std. Error	t	Sig.**	Partial correlation	Part correlation
Step 1 ( $R^2 = .27, p < .01$ )						
Constant	23.666	2.977	7.949	.001		
Baseline SF-36 PCS	.513	.089	5.787	.001	.517	.517
Step 2 ( $R^2 = .47, p < .01$ )						
Constant	32.010	8.295	3.859	.001		
Baseline SF-36 PCS	.383	.086	4.446	.001	.426	.345
Self-efficacy	4.791	1.149	4.169	.001	.404	.323
Baseline SF-36 MCS	-.266	.115	-2.312	.023	-.238	-.172
Baseline depression	-.969	.350	-2.766	.007	-.281	-.214

\*Beta values quoted are the un-standardised coefficients \*\* significance correct to 3 decimal places

A summary of the key findings around predicting quality of life can be found in Box 4.

Findings in this section report the predictors of quality of life at six months. Quality of life MCS at six months was predicted by the MCS, self-efficacy and depression prior to surgery and by age. Baseline MCS accounted for 45% of the total variance with age explaining an additional 5% and self-efficacy and depression a further 8% of the total variance. This suggests that although over

half of the variance in scores can be explained there remains just over 40% of the variance in MCS that must be accounted for by variables not measured in this study. Quality of life PCS at six months was predicted by the PCS, MCS, self-efficacy and depression prior to surgery. Baseline PCS accounted for 27% of the total variance with self-efficacy, depression and baseline MCS explaining a further 20% of the total variance. Therefore, there remains just over 50% of the variance that must be accounted for by variables not measured in this study.

Both MCS and PCS were predicted by self-efficacy and depression. However, around 50% of the variance has not been explained by the variables measured in this study and thus any model developed from this study incorporating quality of life as its outcome cannot be complete.

*Box 4: Predicting quality of life: key points*

- Overall quality of life six months post-surgery is predicted by pre-surgery quality of life, depression and self-efficacy and by age
- Approximately 50% of the variance is not explained by the regression models
- Other variables not measured in this study also contribute to predicting quality of life after CABG.

#### 5.5.4 PERCEIVED RECOVERY

This section reports on findings related to the previously stated aim to identify the proportion of patients that do not report a complete perceived recovery post-CABG.

Participants were asked post-surgery whether they felt they had recovered from their surgery (responses were “yes, definitely”, “yes, to some extent”, “no” or “don’t know”). At six months post-CABG, 43.8% reported they were completely recovered from the surgery with a further 43.8% reporting they had recovered to

some extent while a minority of participants reported they had not recovered (7.6%) or were “not sure” (4.8%). Perceived recovery was higher at twelve months with 59.3% reporting they were completely recovered, 30.9% that they were “somewhat” recovered and 4.9% reporting they had not recovered with a further 4.9% that they were not sure. Closer inspection of the data showed no change in perceived recovery for the majority of participants, (i.e., people who thought they had somewhat recovered at six months), reported the same at twelve months, although 22 participants reported some improvements. However, nine participants who reported they had completely or somewhat recovered at six months post-surgery reported a worse state of recovery at twelve months.

Asked at six months post-CABG if surgery had been worthwhile, most thought “definitely” (74.3%) or to “some extent” (15.2%) with only those participants who had not completely recovered indicating that surgery had not been worthwhile (See Table 7).

*Table 7: Six months post-surgery – Perceived recovery and surgery worthwhile*

		Do you feel your heart operation was worthwhile?				Total
		Yes, definitely	Yes, to some extent	No	Not sure	
Do you feel you have recovered from your heart operation?	Yes, completely	44	1	0	1	46
	Yes, to some extent	32	11	1	2	46
	No	1	3	3	1	8
	Not sure	1	1	0	3	5
Total		78	16	4	7	105

These figures did not change substantially by twelve months post-CABG, although it is interesting to note that a few participants who feel fully recovered from surgery do not feel it was worthwhile (see Table 8).

*Table 8: Twelve months post-surgery – Perceived recovery and surgery worthwhile*

		Do you feel your heart operation was worthwhile?				Total
		Yes, definitely	Yes, to some extent	No	Not sure	
Do you feel you	Yes, completely	54	1	2	0	57
have recovered	Yes, to some extent	19	10	0	1	30
from your heart	No	1	2	1	1	5
operation?	Not sure	0	1	0	4	5
Total		74	14	3	6	97

*Predicting perceived recovery*

One of the aims of the study was to identify factors that could predict perceived recovery six months post-surgery. As the aim is also to provide information that is clinically useful to health professionals, it was decided only to investigate which pre-surgical variables were predictive of outcome, as these are the only variables that would be available to staff prior to surgery and thus the only variables they could use to identify a patient at risk of poorer post-CABG recovery.

The logistic regression was run with only the significantly correlated variables included. Correlations reported above suggested multicollinearity between perceived stress and other predictor variables and so was not included in the regression. The initial logistic regression model correctly classifies 70.1% of participants. A table of the coefficients of the predictors in this first model can be found in Appendix 8 (Table A3).

The least significant variable was then eliminated from the second analysis, and then the next least significant variable from the following analysis. This process was continued until a model was produced in which all variables were

statistically significant at the  $p < .05$  level. The variables that were eliminated, in order of removal, were: baseline optimism, baseline anxiety, baseline SF36 MCS, baseline SF36 PCS and gender. The final model, shown below in Table 9, correctly classifies 71.8% of participants and includes baseline depression and self-efficacy.

*Table 9: Final model of predictors of 6 months post-CABG perceived recovery*

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
							Lower	Upper
Depression	.196	.069	8.174	1	.004	1.217	1.064	1.392
Self-efficacy	-.744	.300	6.157	1	.013	.475	.264	.855
Constant	1.386	1.041	1.773	1	.183	3.999		

$R^2 = .17$  (Hosmer & Lemeshow),  $.21$  (Cos & Snell),  $.28$  (Nagelkerke). Model  $\chi^2(3) = 24.47$ ,  $p < .0001$ .

The final model using all variables was assessed for multicollinearity and no tolerance values were less than 0.2 and no VIF was greater than 10. Although the eigenvalues were a little large with a few high variance proportions, the correlation matrix (data not shown) did not indicate any very high correlations between variables. Cook's distance and Leverage statistics did not suggest that any influential cases were having an effect on the model. Looking at the standardised residual, no values were greater than  $\pm 2.5$  and only 5% of cases were above  $\pm 2$ .

#### *Perceived recovery summary*

A summary of the key findings around perceived recovery can be found in Box 5.

Findings in this section show the proportion of participants reporting complete or incomplete perceived recovery, the predictors of this and whether surgery was worthwhile. At six months post-CABG, just over 40% of participants reported

they had completely recovered with the same proportion again stating they had recovered to some extent, leaving just over 12% of participants saying they had not recovered or did not know. At twelve months the number of people who felt they had recovered completely increased, although almost 10% of participants still had not recovered or did not know if they had recovered indicating that complete recovery takes more than six months for a substantial proportion of patients and is not complete for a few twelve months post-surgery. This finding is contrary to the findings showing little change in quality of life scores from six to twelve months. As with quality of life, perceived recovery was predicted by self-efficacy and depression prior to surgery, with over 70% of participants being correctly classified as completely recovered or not using those two predictors.

Participants were also asked at six months post-surgery if they felt surgery was worthwhile, with almost three quarters reporting it was; a figure that did not change greatly at twelve months. However, some participants felt surgery was not worthwhile, including some at twelve months who reported they had completely recovered. This suggests that, although complete recovery is not the only criterion by which patients judge if surgery has been of value to them, it is important with most of those feeling surgery was not beneficial to them also reporting incomplete recovery.

*Box 5: Perceived recovery key points*

- At six months 43.8% of participants reported complete perceived recovery, increasing to 59.3% at twelve months
- Around 12% of participants had not recovered or were not sure at six months; this decreased to 9.8% at twelve months
- Complete perceived recovery took twelve months or more for a substantial proportion of participants
- Predictors of perceived recovery were self-efficacy and depression prior to surgery
- A few participants did not feel surgery was worthwhile including both those who reported they had not recovered and those who felt they had completely recovered.

## 6 DISCUSSION

### 6.1 PARTICIPANTS

Uptake of the study was disappointingly low with an adjusted response rate of 56.3%. As response rates were not noted in most papers with comparable research designs it is not known if the rate in this study is typical. In line with ethics committee guidelines patients did not have to give a reason for declining to take part and none voluntarily provided one so it is not known why almost half of those approached did not take part. It may be that patients felt they had many other issues to deal with at the time, a lot of information about surgery and recovery to consider and many preparations to make before surgery and felt that taking part in a longitudinal study too much extra to contend with at that time. Although the questionnaire was designed to be as clear as possible, was in font size 14 and included as much “white space” as possible, it may be that some participants found the form off-putting or difficult to read and this affected response rates. Literacy levels may have been lower among this population,



particularly among those whose first language is not English, and who may have had difficulty in understanding the form. The possibility of completing the questionnaire over the phone was offered to all participants but none took up this option.

Giving questionnaires to eligible participants in person at the surgical consultation clinic did not increase uptake. Men were more likely than women to take part, as found in other studies (Sjoland *et al.*, 1999; Koivula *et al.*, 2001). Reasons for this gender difference are not known but field notes of the visits to these surgical consultation clinics suggested that women were more anxious than the men. This was not a formal assessment of anxiety but merely an observation, suggesting a possible explanation for the gender uptake discrepancy that matches other research findings showing that women on the waiting list for CABG had greater fear than men (Koivula *et al.*, 2001). Future investigations of possible reasons for non-participation could involve nursing staff at the surgical consultation clinic or pre-operative assessment clinic.

The death rate of participants in this study was 3%; although the causes of death of participants in this study are not known, this rate is not atypical. Previous studies in this area have not reported participants withdrawing because they declined surgery, sometimes in favour of alternative treatment options. In this study the number of participants declining CABG represented 5.8% of total eligible participants. The use of reminders in this study increased uptake and follow-up responses by approximately 10% and was, therefore, a worthwhile method of maximising participation.

Drop-out from the study across time at baseline to six months post-surgery was, at 16%, much higher than in similar UK research studies (Lindsay *et al.*, 2000a) and again reasons for this are not known, as participants were not requested to provide a reason for declining. Only two participants voluntarily gave an explanation, both saying they had family issues to deal with and did not feel able to spend the time on the study. A possible explanation, alluded to by participants in the interview study, may be that after surgery participants felt that they were “cured” and there was no longer any problem with their heart and

thus the questionnaire asking about their heart surgery may have been perceived as being of little relevance to them. Women were less likely to respond at six months (also found by other research, Vingerhoets *et al.*, 1995) and statistical analysis of responders and non-responders at six months post-surgery indicated that non-responders were older and had greater depression, anxiety, perceived stress and poorer mental well-being. Again specific studies would be needed to understand possible reasons for non-response.

Most patients taking part in the study reported their ethnic origin as White British. The ethnicity of patients not taking part in the study cannot be assessed as this information was not readily available. However, 11.3% of the Coventry general population is Asian/Asian British (Office for National Statistics, 2004), suggesting that this ethnic group was under-represented in this research and alternative ways of recruiting these participants, such as via community groups (as suggested by Sheldon and Rasul, 2006), may need to be considered for future research. Given the age group participating in this study, the numbers indicating they left school before 16 or had no formal education qualifications is not unusual nor is the majority reporting themselves as married with almost 14% indicating they were widowed.

## 6.2 QUESTIONNAIRE DATA

The aims of this component of the study are to describe the pattern of psychosocial functioning, quality of life and perceived recovery across the surgical pathway. As improving quality of life is a goal of CABG it is important to see how this changes along the surgical pathway, identify the proportion of people who report improved or worsened quality of life and identify any predictors of this outcome that will enable staff to target interventions to those patients at risk of poorer recovery.

The pattern of psychosocial functioning across the surgical pathway shows an improvement at six months post-CABG compared to pre-surgical levels for the majority of participants. Poorer psychosocial functioning prior to surgery is not unexpected given the understandable anxiety and stress associated with

undergoing heart surgery and reflects other work (Ellard *et al.*, 2006). However, a substantial proportion of participants did not report improved psychosocial functioning post-surgery. There was little change in overall social support, optimism and self-efficacy mean scores from pre- to post-surgery, probably reflecting the more stable “personality trait” attributes of these variables. Although attendance was not independently verified, the percentage of participants who reported they had attended or were still attending rehabilitation classes is higher than noted in other studies (Cooper *et al.*, 1999; Beswick *et al.*, 2004), but similar to 2004 figures reported by Bethell *et al.* (2006).

The findings from this study - that pre-operative physical functioning (Lindsay *et al.*, 2003) and quality of life (Elliott *et al.*, 2006) pre-surgery were lower than the general population and improved after surgery, that most participants reported their health as much or somewhat better than pre-surgery (Elliott *et al.*, 2006), that a substantial proportion of participants reported a decline in quality of life after surgery (Lindsay *et al.*, 2000a; Hawkes and Mortensen, 2006) - support previous work. Poorer quality of life pre-surgery is expected given participants’ older age and need for CABG and the stress and anxiety of undergoing surgery. Findings show that the majority of people experience an improved quality of life post-CABG compared to pre-surgery, and thus CABG has achieved one of its stated aims. However, a number of participants reported a decline in quality of life post-surgery. As with psychosocial functioning, the reasons for this decline are not known and may be caused by several factors unrelated to the surgical experience but if some of the participants are reporting a worsening psychosocial well-being and quality of life as a consequence of undergoing CABG, this is a cause for concern given the aim of CABG to improve quality of life.

Findings also indicate that, overall, there was little change in quality of life and psychosocial factors from six to twelve months post-surgery, a finding that complements previous research (Jaarsma and Kastermans, 1997; Boudrez and De Backer 2001; Kattainen *et al.*, 2006). However, participants were also asked to indicate if they felt they had ‘completely’, to ‘some extent’, or ‘not’

recovered after surgery and there was a substantial increase from six to twelve months in the number of people reporting they had completely recovered after CABG. This suggests not only that recovery is not complete for everyone at six months but can take some months longer, but also that there is an additional aspect to recovery that is not adequately measured with quality of life and psychosocial variables. This was also supported by the large correlations between the variables of quality of life and perceived recovery, which were not, however, so high as to suggest they were measuring the same construct, thus suggesting that quality of life is not the sole criterion by which participants judge recovery post-CABG. This is supported by comments from interview participants that recovery is a multi-faceted concept.

Prior to surgery the majority of participants rated their health as worse than twelve months previously: at six months post-CABG the majority rated their health as better than one year previously, showing a positive change in health after surgery. However, over 14% of participants said their health was worse six months after surgery compared to before CABG. This may, for a few participants, be due to other unrelated health problems; however, the interviews suggested that it may, for a few participants, reflect an unfavourable comparison with pre-operative functioning. Interview participants with few perceived pre-operative angina symptoms reported they felt physically well prior to surgery, but after surgery found the wound and chest discomfort and physical difficulties very limiting and so they felt worse after surgery than before it. This unfavourable comparison between pre- and post-surgery may also account, in part at least, for the number of people who reported that they had not fully recovered and who felt surgery was not worthwhile.

With regard to the aim of predicting prior to surgery those patients who would experience poorer quality of life and perceived recovery after surgery, depression and self-efficacy were predictors of all three outcome measures (SF36 MCS, SF36 PCS and perceived recovery). For the six month post-surgery SF36 MCS, self-efficacy and depression accounted for an additional 9% of the variance explained (age gave an additional 5% to add to the 45%

explained by baseline SF36 MCS). For the six month post-surgery SF36 PCS, self-efficacy, depression and pre-surgery SF36 MCS explained an additional 20% of the variance (to add to the 27% already explained by pre-surgery SF36 PCS). This provides a useful indicator to help healthcare staff identify before surgery those patients who may experience a poorer recovery after CABG; those with pre-surgical depression and low self-efficacy may benefit from further follow-up and intervention by staff to improve their recovery. Both these factors can be quickly and easily assessed by staff in, for example, the pre-operative assessment clinic to highlight patients who may potentially require more after-care and post-surgical intervention, perhaps in the form of increased information, advice and support.

However, for both quality of life outcome variables, although the variables explained much of the variance, there is still a substantial amount of variance not accounted for by the variables included in the questionnaire, indicating the existence of one or more previously unconsidered factors that also need to be included in any model of recovery. Possible factors to be included will be considered further in *Chapter 7 – Discussion*. Using pre-surgery self-efficacy and depression enabled 70% of patients to be correctly classified as completely recovered or not at six months post-surgery. Again, 30% of patients would be incorrectly classified using these two variables suggesting that there are other variables that are important in predicting who will report a complete perceived recovery. Other research has also suggested the importance of distress (Panagopoulou *et al.*, 2006), depression (Doering *et al.*, 2005; Goyal *et al.*, 2005) and self-efficacy (Shelley and Pakenham, 2007) in quality of life and psychological well-being post-surgery.

Variables not contributing to the predictive model included rehabilitation class attendance, anxiety and social support despite past research and interview participants in this study suggesting their importance in recovery. It may be that the measures used to assess these variables were not sensitive enough or did not accurately measure the variable concerned. The literature review suggested type of social support may be more important than amount and the

questionnaire in this study may not have adequately assessed the concept. It is also possible that these variables affect recovery through mediating relationships and these were not, therefore, apparent in the regression model. It may be, for example, that rehabilitation class attendance affects recovery by increasing self-efficacy and resumption of daily activities and that social support decreases depression and thus is not in itself important to recovery but affects depression that in turn affects recovery.

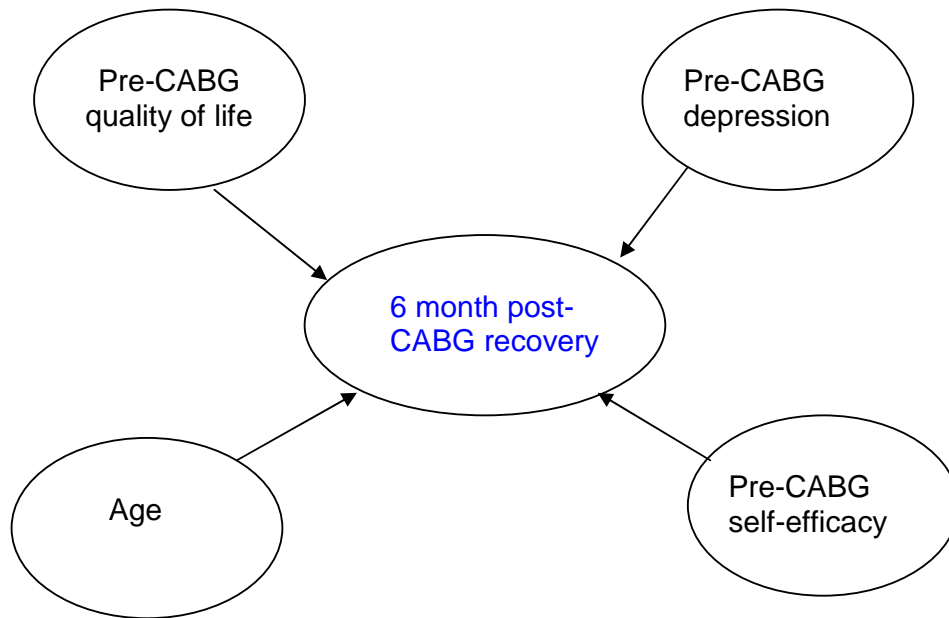
### 6.3 MODEL DEVELOPMENT

Findings from the statistical analysis suggest that recovery (including concepts of quality of life and perceived recovery) is predicted by age and pre-surgical quality of life, depression and self-efficacy. The most parsimonious model suggested by the data is represented in Figure 6 where recovery comprises quality of life and perceived recovery and is influenced by pre-surgical quality of life, depression, self-efficacy and age.

However, as noted above, there are other variables not measured in this study that are important in recovery and thus this model is not complete. It is also possible that there are mediating relationships that are important and have not been explored in this study but will need to be identified and investigated in future research.

In *Chapter 7 – Discussion*, findings from the patient and health professional interviews will be used to elaborate on this model and propose possible mediating relationships and other important variables to be included in a model of recovery.

Figure 6: Basic model of recovery



#### 6.4 FURTHER WORK

Further work is needed to test the proposed model of recovery and identify factors not currently included (this will be discussed further in *Chapter 7 – Discussion*). It is possible (as indicated by participant interviews) that carers, perceived symptom severity and expectations of surgery (also noted by Elliott *et al.*, 2006) are also important (as discussed in *Section 7 Limitations*). The results here suggest that recovery from CABG comprises more than quality of life and further work exploring these factors and how best to assess recovery from CABG would be a useful next step.

Participant numbers were too limited here to undertake structural equation modelling of the data but, in larger studies, this would be an appropriate method by which to devise and/or test a more complete model of recovery. This analysis technique would also allow the opportunity to assess covariance between variables and any mediating relationships and the influence of these on the outcome variable.

## 6.5 LIMITATIONS

The major limitation in this research is the low response rate. Almost half of those approached did not take part in the study with women being more likely to decline or not respond (also found in the study by Koivula *et al.*, 2001), as was also the case at the six month follow-up. This resulted in women being under-represented in the sample, as were those from other ethnic groups. There were also significant differences in those who completed the follow-up questionnaires and those who completed only the baseline questionnaire prior to surgery on most psychosocial variables with those not responding having lower mental well-being. Despite the use of alternative recruitment methods, participant numbers were low.

During the analysis it was identified that some questions had not been included on the questionnaire and others would have provided more useful data had they been re-worded. The question on marital status may have given a further measure of social support available had it been worded to ask whether participants lived alone, a question on perceived severity of symptoms pre-CABG could have provided an interesting aspect to consider in post-surgical recovery as would an objective measure of disease severity (perhaps utilising routinely collected hospital data, such as the Euroscore) and presence of angina symptoms, as this has been associated with differences in quality of life post-CABG (Pirraglia *et al.*, 2003). Some participants added comments to the questionnaire to indicate that co-morbidities, typically arthritis, influenced how they responded to certain questions, particularly quality of life, and a question asking about the presence or absence of these may have been useful to include as a covariate in subsequent analysis. That co-morbidities are not taken into account in the SF36 has been noted before (Corcoran and Durham, 2000). The interviews undertaken also suggested the possibility that some people were experiencing a return of angina symptoms and this may have affected participants' perceived recovery and quality of life and a question could have asked about this aspect. It may also have been useful to ask participants prior to surgery about their anticipated recovery to identify if decreases in quality of



life and mental well-being were associated with unmet expectations (unrealistic expectations of CABG have been identified in earlier qualitative work, Lindsay *et al.*, 2000b) and surgery not being perceived as worthwhile. Correlations indicated that perceived stress was highly correlated with anxiety, depression and the mental component score of the SF36 and thus did not add to the analysis.

Due to the low sample size the statistical analysis should be treated with caution. Although there were sufficient participants to undertake the regression analyses, a larger sample size would have increased the power of the study and given greater confidence in the findings.

## 6.6 CONCLUSIONS

This research has identified that recovery post-surgery encapsulates more than quality of life only; that a concept of perceived recovery is also important and by considering the two factors together a fuller picture of recovery can be discerned. Depression and lower self-efficacy prior to surgery was associated with poorer recovery. However, other variables indicated by past research, including findings from the qualitative components of this research, to be important in recovery were not statistically predictive of outcome. This may be due to methodological issues in measuring these concepts or, as indicated by interview data presented in earlier chapters, be due to mediating relationships whereby rehabilitation and social support affect recovery indirectly through self-efficacy and depression respectively. Identifying two variables that predict recovery has suggested a focus for the development of interventions but further work with a larger patient participant sample (including more women and people from other ethnic groups) is needed to replicate these findings, to assess any mediating relationships and identify if there are any other important variables that need to be included in any model of recovery.

## Discussion

### 1 INTRODUCTION

The overarching aim of this study was to identify barriers and facilitators to recovery after CABG and to develop a model of recovery. This includes the related aims of:

1. Describing the recovery experience
2. Patient and health professionals' views on barriers and facilitators to recovery
3. Identifying factors that predict perceived recovery and quality of life post-surgery
4. Developing a model of recovery.

This chapter brings together the key findings related to these aims to provide an insight into the experience of and barriers and facilitators to post-CABG recovery.

### 2 SUMMARY OF RESULTS

The key findings related to each of the aims noted above will be summarised here (further details can be found in *Chapters 4, 5, and 6*). Important in this research was not just the identification of issues relevant to recovery after CABG but also the processes by which these issues may impact on patients' perceived recovery. Understanding how factors are important in recovery will suggest possible interventions that can aid a quick and complete recovery.

#### 2.1 THE RECOVERY EXPERIENCE

Participants interviewed in Phases 1 and 2 described their experiences of undergoing CABG from prior to surgery through to one year post-surgery and what constituted 'recovery'. Qualitative research in this field is sparse (Gardner *et al.*, 2005) and this study has added to that currently limited work and so contributed to the body of knowledge in this area. Identifying what patients

believe equates to a good recovery and a worthwhile outcome from CABG is important. This information can help identify patients' expectations of surgery so that healthcare professionals can help ensure these are achieved.

Several participants reported that, prior to surgery, they were unaware of their heart condition, many attributing the angina symptoms to increasing age and/or indigestion. Learning these symptoms were cause for concern and necessitated major surgery was, therefore, a shock and supports other work (Lindsay *et al.*, 2000b; Screeche-Powell and Owen, 2003). Despite the great decreases in waiting times for surgery over the past few years, several patient participants in this study reported the waiting as the worst part of undergoing surgery (Fitzsimons *et al.*, 2000; McCormick *et al.*, 2005). Not knowing what to expect, not being able to make any plans, and anxiety that they may have a myocardial infarction (MI) before undergoing surgery (Fitzsimons *et al.*, 2003; Sampalis *et al.*, 2001) suggests this is a part of the surgical journey where some patients may benefit from intervention. Some Trusts offer 'prehabilitation', where information about surgery is provided and sometimes includes risk behaviour modification. This may provide patients and their carers with the opportunity to plan ahead for the practical aspects of recovery and begin the process of emotional preparation for surgery (an aspect associated with good recovery by participants in this study). However, limited research of pre-surgical interventions is available in this area and existing findings suggest there is little reduction in anxiety (Shuldham *et al.*, 2002; Asilioglu and Celik, 2004) although a recently published qualitative study (Mooney *et al.*, 2007) of eight patients awaiting CABG found that participants' reported benefits in terms of reduced anxiety, increased physical activity and improved confidence suggesting this may be an area worth exploring further.

Similarly, whilst in hospital and after surgery, two patients reported severe anxiety that the surgical team had found cancer or some other major medical problems during the surgery but were withholding this information. This anxiety lasted for a year at least and again suggests a time when intervention may be beneficial to recovery. These anxious participants reported that, although other

members of the surgical and nursing teams were available, they wanted to speak to the consultant prior to discharge, as this would provide an opportunity to ask any questions and receive reassurance that all had gone well and so ease their anxiety and enable them to feel they were recovering well. That the consultant should be singled out as being a necessary source of information and reassurance that surgery went well is not surprising. One patient commented that, although he felt the nursing staff very competent, they had not been present during surgery so could not know what had happened during it. Primarily though, the consultant was the person patients saw at the surgical clinic and their trust and confidence in him was established at that appointment. The benefits to recovery and positive experiences of care of having trust in healthcare staff have been noted (Higgins *et al.*, 2000; Beinart *et al.*, 2003) although how staff can help foster this has not been previously reported. Participants in this study suggested that this confidence was engendered by the consultant surgeon being personable, friendly, revealing a little personal information about themselves, being relaxed and confident in their ability to perform the surgery and that it would go well for the patient and result in a good outcome in terms of symptoms relief, prognosis and improved quality of life. These attributes helped patients relax and decreased anxiety they had about the procedure itself and about their agreement to undergo it.

Also not noted in previous qualitative work is the view participants in this study had that they felt they had no option about whether to have CABG. The consultant surgeon made clear the risks of having surgery, but also the risks of not undergoing the procedure with respect to further deterioration of physical functioning and quality of life, increased angina symptoms, and the increased possibility of MI and death. The opinions and recommendations of the consultant surgeon were highly influential in patients agreeing to surgery, in the same way that the reassurance that CABG had gone well provided after surgery was influential in easing patients' anxiety about the procedure and their recovery. Trust in the consultants and their advice to carry out mobilising and rehabilitation exercises was also an important facilitator to recovery that will be discussed later.

Another important aspect of the recovery experience discussed by participants is that of after-care. All praised the after-care nurses from the hospital whose proactive support was valued and gave participants (and their spouses) the impression that they were still being cared for by the hospital and had not been discharged and forgotten. That advice and support was available from the hospital at any time was reassuring to participants and helped ease anxieties, although some participants felt more information on what constituted a normal recovery and so what pains and symptoms were to be expected and not a cause for concern would be beneficial (Doering *et al.*, 2002; Kattainen *et al.*, 2004). However, all participants in this study who needed district nursing care reported that this was either not provided, or not provided as often as they felt was necessary. This caused concern to patients and their spouses, who often had difficulty putting on the anti-embolic stockings and required help with this, or had worries that the surgical wounds were not healing properly and needed reassurance from a health professional that the wounds were not infected. Only a few participants reported being asked by their General Practitioner to come in to see them for a check-up at any time after surgery, yet many felt this would be beneficial, as it would provide an opportunity to discuss any concerns, go over medications and receive reassurance that recovery was complete or was progressing well. That the majority of the after-care needs noted by participants revolve around receiving reassurance suggests an area where greater primary care input in post-CABG recovery could be useful for some patients and their carers, particularly those who describe themselves as anxious people, to help alleviate their concerns and so promote recovery.

Identifying these individuals who require targeted intervention need not require any complex assessment. Interviews with health professionals in this study suggested that staff are already aware of many individuals who are anxious or depressed and those who may, from their clinical experience, not do so well as others. Identifying the best time to provide extra information, support and reassurance, and from whom, however, needs further study.

### 2.1.1 RECOVERY

As noted earlier, identifying what patients feel constitutes a good recovery has not been much discussed in past research. Patients and health professionals in this study, and in line with other research (Knoll and Johnson, 2000; Theobald and McMurray, 2004), agreed that recovery was returning to normal functioning. However, further discussions with patients indicated that this returning to normal functioning involves several differing aspects. These included not just returning to hobbies, such as gardening or playing golf, but doing so without any pains from the chest incision or wounds in the legs where veins were harvested. Long-term discomfort from these wounds has been noted previously (Rowe and King, 1998; Anderson *et al.*, 1999; Theobald and McMurray, 2004; Gardner *et al.*, 2005). Those patients who reported a return of symptoms, breathlessness and tiredness in the legs particularly, were not sure if they had fully recovered from surgery, as they did not know if the pains were associated with surgery or not. An absence of perceived surgical-related symptoms would then appear to be an important issue in patients' definition of 'recovery'. Coming through the interviews with patients was also the issue of expectations (Lindsay *et al.*, 2000b). Many described their expectations of surgery, often derived from experiences of peers and from the anticipated outcomes described by the consultant surgeon. Unmet expectations from surgery caused great despondency and left those participants unsure as to whether they would ever recover. Without such expectations their view of their recovery may have been different and this issue needs exploring further.

The questionnaire in this study used two measures of recovery; quality of life and perceived recovery. That these aspects were not highly correlated suggests they were measuring different aspects and thus recovery is a multi-faceted issue and supports patients' accounts. Teasing out the various facets is needed to identify what criteria patients use to determine if they have recovered.

The time taken to recover is another aspect of the recovery experience not often described in the existing literature. In this study, health professionals at

the hospital suggested complete recovery took around six weeks, those at the rehabilitation centre felt it was around three months. It is likely that the discrepancy in times reflects the differing priorities of these health professional groups. Patients interviewed felt that full recovery took at least 3 months but many had not fully recovered a year after surgery, a large discrepancy with the timeline suggested by health professionals. This may be in part because patients included chest and leg wound healing as part of recovery, which took more than six months for some individuals, and an absence of perceived heart related symptoms. Additionally, some patients were unsure if they had recovered, and had no access to a healthcare professional who they felt could advise them on this, and others did not feel they had yet achieved the goals that other peers had or that the consultant surgeon had cited as anticipated outcomes of surgery.

Another discrepancy in recovery timeline, and a key finding from this study, appears to be related to perceived severity of pre-operative symptoms; a finding that complements consultant surgeons' clinical experience (Norton, 2005, personal communication). Those with severe pre-operative symptoms reported a quicker recovery than those with few perceived pre-operative symptoms. A comparison with pre-CABG living seems to be a major factor in defining recovery. Recovery appeared to be complete once the earlier described criteria had been met and when life after surgery was perceived as better than before CABG. This finding requires replication but if robust suggests that healthcare staff may need to adjust the anticipated recovery information they give to patients according to patients' perceived symptoms, which may not be the same as how staff perceive the severity of symptoms. These patients with few perceived pre-operative symptoms may need additional support post-surgery, perhaps from the after-care nurses, at the six-week discharge clinic or from the primary care team.

A variety of perceived recovery times is also indicated by the questionnaire data. Whilst quality of life was fairly stable from six to twelve months, showing little further improvement, the number of participants reporting they had

completely recovered from their surgery increased greatly over the same time, although there were still a substantial number of people who did not feel at all or only somewhat recovered one year after CABG.

## **2.2 BARRIERS AND FACILITATORS TO RECOVERY**

Numerous barriers and facilitators to recovery were identified through the interviews and questionnaire data. These are discussed under the three main time-frames of the surgical pathway, pre-surgery, the hospital experience and post-surgery and summarised in Box 1. The interview data enabled a further exploration of the possible processes by which the barriers and facilitators have their effect on recovery – an aspect not often included in previous research.



*Box 1: Summary of facilitators and barriers to recovery*

Facilitators	Barriers
<b>Pre-surgery</b>	
<ul style="list-style-type: none"> <li>• Trust and confidence in healthcare staff</li> <li>• Seeing ward/meeting staff</li> <li>• Having information about procedure</li> </ul>	<ul style="list-style-type: none"> <li>• Being reluctant to have surgery</li> <li>• Cancellations/long delays</li> <li>• Few perceived symptoms</li> </ul>
<b>Hospital experience</b>	
<ul style="list-style-type: none"> <li>• Higher pain threshold</li> <li>• Trust in healthcare staff</li> <li>• Optimism/determination</li> <li>• No clinical risk factors or complications during surgery/recovery</li> </ul>	<ul style="list-style-type: none"> <li>• Longer ITU stay</li> <li>• Older age</li> <li>• Negative peer comparisons</li> <li>• Anxiety/depression</li> <li>• PTSD</li> </ul>
<b>Post-surgery</b>	
<ul style="list-style-type: none"> <li>• High self-efficacy</li> <li>• Rehabilitation class attendance</li> <li>• Instrumental and emotional social support</li> <li>• After-care from hospital and primary care staff</li> </ul>	<ul style="list-style-type: none"> <li>• Prolonged wound healing</li> <li>• Return of symptoms</li> <li>• Negative effects of surgery (loss of confidence, lower cognitive functioning)</li> <li>• Expectations of surgery and recovery not met</li> </ul>

**2.2.1 PRE-SURGERY**

Patients who had trust and confidence in health professionals prior to surgery (Higgins *et al.*, 2001) reported that they were less anxious about undergoing CABG and so approached surgery in a more positive frame of mind. Their confidence in the surgeons gave them reassurance that the operation would go well, and result in a good outcome and this was related to a better recovery. Emotional preparation was also a facilitator to recovery, as found in other studies (Lindsay *et al.*, 2000b; Higgins *et al.*, 2001). Participants felt that seeing the hospital ward and meeting the staff there helped patients mentally prepare

for, and come to terms with, their need for surgery. Having information about CABG helped with this preparation and so helped patients recover well.

Barriers to recovery prior to surgery include being reluctant to undergo surgery, as, health professionals felt, this approach to surgery meant patients were not emotionally prepared for CABG or recovery and these patients did not do so well as others. Another barrier is experiencing delays and cancellations whilst waiting for surgery, which interrupted this preparation and also caused patients anxiety that they may have an MI, as has been found in other work (Fitzsimons *et al.*, 2000; Sampalis *et al.*, 2001; Ivarsson *et al.*, 2004; McCormick *et al.*, 2005). The final barrier to recovery noted, identified as a key finding from this research concerned those patients reporting few perceived pre-operative symptoms. These patients found recovery more difficult initially and took longer to report a complete recovery than those patients who reported severe pre-operative symptoms. This difference in the recovery trajectory reflects the comparison between early post-operative life and pre-surgery. Those with few symptoms prior to surgery said they felt quite well and did not experience many, if any, limitations on their activities, which contrasted poorly with early post-CABG experiences of pain and severe limitations.

### 2.2.2 HOSPITAL EXPERIENCE

Patients with a higher pain threshold may be more likely to continue with the often painful and difficult mobilising and breathing exercises recommended to aid recovery. Confidence and trust in health professionals as a facilitator to recovery is also apparent through adherence to these exercises; patients who trusted the staff were more likely, participants felt, to attempt and to continue trying the exercises. The lack of any clinical risk factors or complications during surgery were noted as facilitators by healthcare professionals interviewed, as these could affect a patients' physical recovery. Patients also felt that, for example, having a chest infection or a bad cold, made them feel physically weaker and so it took them longer to mobilise after surgery and supports other work noting the impact of clinical factors on recovery (DeRose *et al.*, 2005;

Herlitz *et al.*, 2005). The major facilitator identified by participants in this study was the presence of optimism/determination. All participants felt this was important to recovery as patients would strive for a good recovery and do all they could to achieve this. The benefit of an optimistic personality trait has been noted elsewhere (Scheier *et al.*, 1999; Ben-Zur *et al.*, 2000; Gardner *et al.*, 2005) and is expanded on here by suggesting that the mechanism through which it facilitates recovery is by perseverance (Aspinwall and Brunhart, 2000). That this facilitator may actually reflect high self-efficacy is discussed later in this chapter.

Barriers to recovery identified in this research include a longer ITU stay, a finding that has been identified in previous work (Schelling *et al.*, 2003; Bapat *et al.*, 2005) although this research adds to that existing work by suggesting that the reason for the link is not only due to clinical factors that may have necessitated the longer stay but also to psychosocial factors. Health professionals suggested that the experience of seeing their spouse in ITU (identified before as a stressful experience, Engstrom and Soderberg, 2004) for a longer time than usual led some carers to perceive the patient as very poorly and adopt a nurturing attitude towards them. This may have prevented the patient from mobilising and returning to their everyday activities as quickly as they might otherwise and so impeded recovery. A long ITU stay may also lead to post-traumatic stress disorder (PTSD), already noted as relatively common in post-cardiac patients (Stoll *et al.*, 2000; Schelling *et al.*, 2003; Oxlad and Wade, 2006).

Negative peer comparisons in hospital may be a barrier to recovery as it may lead people to become depressed that their recovery from surgery is going more slowly or is fraught with more setbacks and complications. This may also result in a loss of optimism, and so a loss of that facilitative effect on recovery (as described above). Anxiety was a major barrier noted by participants. Interviewees suggested that people who were anxious were less likely to fully mobilise after surgery as they were fearful of causing pain or damage to their surgical wounds and thus did not resume everyday activities as quickly as

others and so perceived recovery took longer. Anxiety has been associated previously with poorer recovery (Rymaszewska *et al.*, 2003) but this study has begun to suggest possible reasons for this link.

Depression (Doering *et al.*, 2005; Goyal *et al.*, 2005; Oxlad *et al.*, 2006) and older age (Scott *et al.*, 2005) were identified through the quantitative data as barriers to recovery, supporting existing work. The reasons for the detrimental effect of older age are not clear but whilst it may reflect clinical and physical barriers, such as co-morbidities, it may, as suggested earlier, simply reflect cultural norms in expressing emotion and that may be why it is associated with poorer mental well-being in the quality of life measure and not with physical health or perceived recovery. This finding needs further exploration to identify its relevance to recovery. Depression, a predictor of both perceived recovery and quality of life, may be relevant to recovery (as discussed later in greater detail, see *Section 2.1.4*) through a high correlation with anxiety or perhaps a link to poorer social support. Other work has suggested depression may be linked to poorer medication adherence and follow-up care (Connerney *et al.*, 2001; Blumenthal *et al.*, 2003), although these factors were not noted among participants interviewed in this research. Identifying if depression is a primary factor, is mediated by or is a mediator for other variables needs further work.

### 2.2.3 POST-SURGERY

The main facilitator to recovery identified by patients interviewed in this research was attendance at rehabilitation exercise classes, the benefit of which has been discussed before (Lindsay *et al.*, 2000b; Gardner *et al.*, 2005). Comments suggested that attendance gave participants the confidence to resume everyday activities, that prior to the classes they were wary of doing in case they caused damage to their heart or the surgical wounds. Resuming everyday activities was a criterion by which patients determined recovery. Additionally seeing peers (Colella and King, 2004) at the classes demonstrating that a good recovery was possible was helpful, as was the opportunity to discuss their experiences with others and receive reassurance about any

symptoms they were experiencing or answers to any queries, about medication for example. It may be that the classes in fact increase patients' self-efficacy; their confidence in their ability to make a full recovery, the presence of which prior to surgery, predicted improved quality of life and perceived recovery post-CABG and reflects other work (Shelley and Pakenham, 2007).

After-care, provided by hospital after-care nurses, rehabilitation staff, primary care staff or family and friends was also identified as a facilitator to recovery. The lack of primary care support reported by several patients meant some patients experienced anxiety that their wounds were not healing properly and so felt they were not recovering. A key benefit of emotional support was the opportunity to talk over any concerns and receive reassurance and support. The practical support provided was also highlighted as a facilitator to recovery (Blumenthal *et al.*, 2003; Okkenen and Vanhanen, 2006), as patients often reported being completely dependant on others in the first few weeks post-CABG and the practical help was necessary for recovery during those early stages. Health professionals did, however, note that social support could be a barrier to recovery if, rather than encouraging resumption of everyday activities, it pushed patients further into a helpless dependent state, as then these individuals would not resume the everyday activities that are a key characteristic of a good recovery. Previous work on social support has been mixed, with the possibility of the anticipated support, amount, who it is provided by and when being possible complicating factors in determining the true extent of its impact on recovery. This is an area where further in-depth work is needed.

Several barriers to recovery post-surgery were identified. Patients included the healing of leg and chest surgical wounds as a part of recovery and so, if this took a long time (as has been found to be the case for some people, Anderson *et al.*, 1999; Theobald and McMurray, 2004; Tolmie *et al.*, 2006), complete perceived recovery was delayed. Health professionals interviewed did not include this as a major component of their definitions of recovery, yet it appears to be integral to patients' perceptions. Similarly, the absence of any perceived

heart or surgical pains or symptoms were also necessary for patients to feel they had fully recovered. Thus, any perceived return of symptoms after-surgery was interpreted by patients as their recovery not being complete. The return of symptoms and the impact of these on recovery have not been noted previously, perhaps because many studies do not follow-up patients over a longer time – patients in this study reported the return of symptoms around ten to twelve months after-surgery. This is important to investigate further and determine its effect on perceived recovery over the longer-term. It may be that participants associate the return of symptoms with surgical complications, rather than their underlying heart condition because they do not fully realise the causes of their need for surgery. One health professional interviewed reported that some patients see CABG as a “cure” and although patients did not explicitly use this terminology they did refer to surgery as “fixing” their heart problem, suggesting they do not fully comprehend the nature of coronary heart disease and this is an area where further information and explanation may be necessary.

This appears to be linked to the issue of expectations of surgery (Lindsay *et al.*, 2000b). Patients may have unrealistic expectations of surgery and of recovery (in terms of benefits and outcomes of surgery and time taken to recover) and when these are not fulfilled become despondent. A final barrier to recovery noted by participants in this study is the presence of negative effects of surgery. Such loss of confidence (Rowe and King, 1998; Robinson, 2002) and lower perceived cognitive functioning (Bergh *et al.*, 2002; Selnes *et al.*, 2004) was identified by several patients in this research who felt it impacted on their recovery because they could no longer do the activities they used to. Loss of confidence, or worrying that something may happen (such as an MI) while they were outside their home, meant they did not resume their usual activities and thus did not feel they had recovered. Loss of concentration was only reported by one woman but as this affected her ability to carry out her hobbies it prevented her from feeling she had completely recovered from surgery. The impact of perceived decline in cognitive functioning needs further study to assess its association with perceived recovery.

### **2.3 PATTERN OF PSYCHOSOCIAL FUNCTIONING, PERCEIVED RECOVERY AND QUALITY OF LIFE**

One aim of surgery is to improve quality of life (Zamvar, 2004) so it was important to show if there was an improvement from pre- to post-surgery. Quality of life prior to surgery was quite low but similar to that reported in other work (Lindsay *et al.*, 2003; Elliott *et al.*, 2006), and not surprising given the average age of participants and the typical physical limitations and angina symptoms necessitating surgery. On average, quality of life improved at six months post-surgery compared to pre-CABG, but changed little from six to twelve months (Jaarsma and Kastermans, 1997; Boudrez and DeBacker, 2001; Kattainen *et al.*, 2006; Worcester *et al.*, 2007), although earlier research has suggested improvements are apparent over a two year period (Barnett and Halpin, 2003). However, individual change scores show a substantial proportion of patients reporting a worsening quality of life post-CABG (Lindsay *et al.*, 2000a; Hawkes and Mortensen, 2006). Reasons for the decline among some participants in this study are not known. For some it may reflect other life events and be unrelated to surgery, but in-depth exploratory work is needed to try and identify the proportion, if any, of people experiencing a decline in quality of life as a direct result of undergoing surgery. If some experience the decline because of surgery it is important to understand why this is, as CABG is not then meeting one of its stated aims. It may be that people feel worse after surgery compared to before (as suggested by interview participants who had few perceived angina symptoms pre-operatively), or that undergoing surgery caused anxiety and depression as it forced them to consider their health, prognosis and risks of both having and not having surgery. Post-traumatic stress disorder has been identified in cardiac patients previously (Stoll *et al.*, 2000, Schelling *et al.*, 2003; Oxlad and Wade, 2006) and this is potentially an explanation for the reported decrease in quality of life in some patients.

Another aim of surgery is to improve symptoms (Zamvar, 2004). Although participants were not asked about perceived angina symptoms (a limitation of this study), they did report their perceived change in health compared to one

year previously (using the SF36). It would be expected that if CABG was meeting the aim of improving symptoms that post-surgery participants would report their health as better than prior to CABG. Most participants in this study did report an increase in their general health post-surgery, however, some stated it was worse and it is important to identify why this was the case. It may be that other health problems not related to their heart became apparent or that they had experienced complications during surgery. Interview participants suggested another possible explanation – that post-operative life compared less favourably to pre-CABG for those individuals who did not feel particularly ill or suffer greatly from angina symptoms prior to surgery. These patients may perceive that surgery was not beneficial for them in terms of improving symptoms and so recovery may take longer for these individuals and they may not feel that surgery was worthwhile, despite any benefits gained in terms of prognosis.

As discussed earlier, patients perceived recovery as comprising more than just an improvement in quality of life; it includes wound healing and a return to everyday activities. The question on perceived recovery provides an opportunity to assess recovery specifically (rather than quality of life in general). Unfortunately patients' expectations of their recovery were not included in this study (although it may be useful to do this in future studies) so there can be no comparison of anticipated and actual perceived recovery. Around 40% of participants reported a complete recovery at six months, which increased at twelve months. This indicates that, unlike quality of life, further improvements in perceived recovery take place over at least one year after surgery. Interview participants indicated that surgical wounds took some time to fully heal and as their definition of recovery included this aspect, it is not surprising that so many patients reported a complete recovery taking longer than six months. A small number of participants who at six months post-CABG reported a complete recovery, at twelve months said they had only somewhat or not recovered. This apparent worsening may reflect a return of symptoms (reported by several interview participants), thereby indicating to participants that surgery had not been completely successful as yet and so recovery was not complete. It is



important to identify these individuals and ascertain why they felt they either had not recovered at all or that their recovery had deteriorated. These patients could be identified through primary care services, for example a one-year post-CABG follow-up appointment with their GP.

As expected social support and optimism changed little over the course of surgery, probably reflecting the more stable “state” as opposed to trait” characteristics of the constructs. Also, as expected, perceived stress, anxiety and depression decreased from pre-to post-surgery and were also correlated with quality of life. Thus, decreases in levels of anxiety, perceived stress and depression were associated with an improvement in quality of life (as indicated by the correlations) and thus affect patients’ perceived recovery. Self-efficacy increased from pre-to post-surgery, perhaps as a result of the information, advice and support from healthcare staff at the hospital, GP practice and rehabilitation classes. This indicates that it is possible to improve self-efficacy over time and this may be a valuable pre-operative intervention to investigate in future.

In summary, the pattern of psychosocial functioning and quality of life shows, on average, an improvement from pre-CABG to six months post-surgery, with little further improvement from six to twelve months. Most people also reported an improvement in general health compared to pre- surgery. However, a small but substantial number of participants reported a decrease in quality of life six months after surgery (14.9% and 12.8% reported a decrease in the MCS and PCS of the SF36 respectively) after surgery compared to before and 14.3% reported their general health was worse than before they underwent CABG. The number of people reporting a complete recovery increased from six to twelve months post-CABG, although many had not fully recovered one-year after surgery.

## **2.4 PREDICTING PERCEIVED RECOVERY AND QUALITY OF LIFE**

The detailed statistics on predicting perceived recovery and quality of life can be found in *Chapter 6*. The regression equations identified pre-CABG quality of

life, age, depression and self-efficacy as predictors of quality of life and depression and self-efficacy as predictors of perceived recovery. It is not surprising that pre-CABG quality of life predicts post-CABG quality of life (Echteld *et al.*, 2003; Muller-Nordhorn *et al.*, 2004; Herlitz *et al.*, 2005) although age as a predictor of mental health and not of physical health is unexpected and may reflect generational differences in expressing emotion (Duits *et al.*, 1998).

Depression and self-efficacy were, consistent with other research, the main predictors of all outcome variables with lower pre-operative depression (Doering *et al.*, 2005; Goyal *et al.*, 2005) and higher self-efficacy (Shelley and Pakenham, 2007) predicting better quality of life and complete perceived recovery at six months post-CABG. As stated earlier, it was important in this research not just to identify factors associated with recovery but to suggest possible mechanisms through which they have their effect.

Interviewees suggested, similar to other work, that a facilitator to recovery is an optimistic and determined attitude (Scheier *et al.*, 1999; Aspinwall and Brunhart, 2000, Ben-Zur *et al.*, 2000; Gardner *et al.*, 2005). These attributes, participants felt, led patients to persevere and continue striving towards a complete recovery, even when it was difficult. Self-efficacy as a concept refers to a person's belief in being able to successfully achieve a goal (Bandura, 1997). It boosts persistence when the goals are challenging and in the face of failure. High self-efficacy also leads to individuals raising the goals to be achieved once other goals have been successfully accomplished (Phillips *et al.*, 1996). Participants interviewed did not refer explicitly to self-efficacy. However, they did refer to determination to persevere with recovery and being positive that they would achieve that goal – essentially self-efficacy. Thus it is understandable, using participants' accounts, how having high self-efficacy prior to surgery can be predictive of perceived recovery and quality of life. This suggests a clear focus for future intervention studies; if health professionals can increase self-efficacy prior to surgery (perhaps utilising some existing prehabilitation programmes), this may result in better post-CABG recovery. One study (Mahler and Kulik, 1998) aimed to increase self-efficacy prior to

surgery with the use of videotapes and found benefits in length of stay but there appears to be no published evidence looking at interventions on perceived recovery or psychosocial outcomes.

Low pre-operative depression was also predictive of perceived recovery and higher quality of life, confirming previous work (Peterson *et al.*, 2002; Blumenthal *et al.*, 2003; Burg *et al.*, 2003). Several possible reasons why this may be the case were alluded to by interview participants. People who are depressed prior to surgery may lack the optimistic, determined attitude (high self-efficacy) necessary to persevere with achieving a good recovery, as discussed earlier. As depression is highly correlated with anxiety it may be that, although anxiety was not a predictor that the presence of depression also reflects the presence of anxiety - itself a barrier to recovery as described earlier. Health professionals interviewed also suggested that people who are depressed may have less social support and so would not have access to what health professionals felt was an important facilitator to recovery. It may also be that people who are depressed may be less likely to attend rehabilitation classes, again identified by interviewees as a major contributor to good recovery.

It is interesting to note variables that were not predictive of recovery, despite the qualitative findings in this research suggesting otherwise. Attendance at rehabilitation classes is the main example; patients interviewed who had attended considered the classes to be the main facilitator to their good recovery yet this was not included in the final regression models. It may be that the way the variable was recoded ("attended" and "not attended") for the statistical analyses obscured any effect. The "not attended" group included both those patients who did not wish to attend and those who had not yet taken part in rehabilitation classes, but intended to do so in the future. These latter patients may be different from those who did not wish to attend. The small sample size meant it was not possible to have more than two categories and future studies with more participants may be able to include those who have/are attending, those attending soon and those who do not wish to attend categories in the analysis.

It may also be that rehabilitation had its effect through the mechanism of self-efficacy and was not directly a predictor of quality of life or perceived recovery. Participants interviewed elaborated that attending rehabilitation classes gave them the confidence to resume everyday activities and also showed them, through the positive example of others in the class, that a good recovery was possible. What participants are describing is self-efficacy; as reported by another small qualitative study (Mooney *et al.*, 2007), the classes increased patients' belief that they could recover and gave them confidence to resume everyday activities and thus rehabilitation classes may affect recovery via self-efficacy mechanisms (in addition to any direct effect). As noted briefly earlier, anxiety was not included in the regression models, perhaps because the high correlations with depression and the MCS of the SF36 obscured any effect, although participants interviewed felt anxiety to be one of the major barriers to recovery. It is possible that further work with larger participant numbers can utilise structural equation modelling and the contribution of these other factors (direct and via mediating relationships) may be more apparent.

The regression equations used only baseline psychosocial variables, as these are the only variables health professionals would have available, to ensure that the findings from this work could be of clinical benefit to health professionals. The research has identified that self-efficacy and depression are predictors of post-CABG recovery and suggested possible methods by which they may affect post-operative outcome. Health professionals can use this information to identify patients who are depressed and have low self-efficacy prior to surgery as those who may need intervention to help them achieve a good recovery. However, it should be noted that a large amount of unexplained variance remains in the regression equations suggesting there are other variables not measured in this research that are important in recovery. Possible factors have been suggested by the interview data and are incorporated into the model discussed below.

## 2.5 DEVELOPING A MODEL OF RECOVERY

The findings discussed above, have been combined to suggest a possible model of recovery showing barriers and facilitators to recovery at each stage of the surgical pathway. The model is presented in Figure 1. Recovery is defined as patient perceived recovery 6-months post-CABG and includes: the resumption of daily activities, no chest pain or wound healing problems, improved quality of life compared to prior to surgery and no return of angina-like symptoms. The reasons for the factors included are described in the above sections. The influence of carers on recovery was not assessed in detail in this research although interview participants suggested they were highly influential at various stages of the surgical pathway. The points in the surgical pathway where carers affect recovery needs additional research.

Further testing of the proposed model is necessary perhaps using structural equation modelling that could better identify the presence of any mediating relationships, the existence of which was indicated by the interview findings in this research. Possible models of recovery have not often been suggested by earlier research. The few models that have been proposed (Schroder *et al.*, 1998; Echteld *et al.*, 2003; Shen *et al.*, 2004) do not include as many variables as proposed here. It is thus not possible to compare the models although all suggest complex mediation relationships, particularly between social support, optimism, coping and self-efficacy. This supports the findings from the research presented here that highlights not only the importance of self-efficacy in recovery post-CABG but also the need for a holistic approach to investigating this issue, to adequately take into account the inter-relationships, direct and indirect influences of factors on recovery.

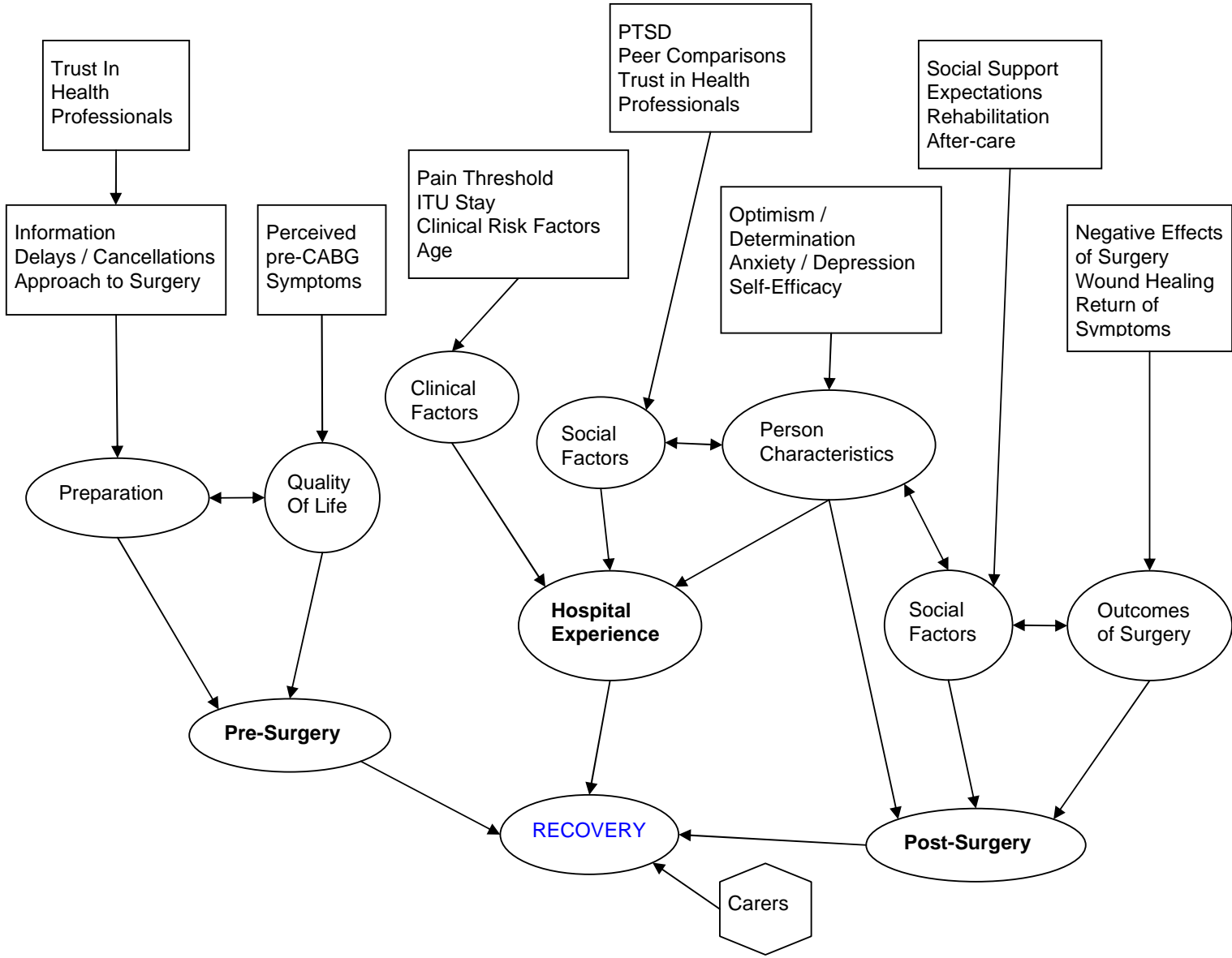


Figure 1: Proposed model of recovery post-CABG

### 3 METHODOLOGICAL REVIEW

As discussed in *Chapter 3 - Methodology Section 1*, a mixed methods approach was taken in this study to provide triangulation. A detailed review of the qualitative and quantitative components of the study will be discussed separately later, but the triangulation used in this study will be discussed here using the four types noted by Denzin (1989) and described in *Chapter 3*.

*Data triangulation*: this was provided by interviewing patients and health professionals in Phase 1 to provide information on barriers and facilitators to recovery from different viewpoints and by interviewing patients prior to surgery and twice after CABG in Phase 2. It was not feasible for the third subtype concerning space to be undertaken in this study. *Investigator triangulation*: although not undertaking any of the data collection or analysis, study supervisors provided inter-rater reliability on a sub-set of interviews and took part in discussions on analysis interpretations so increasing the reliability of the findings by limiting the potential for subjective bias. The aim of this study was to identify barriers and facilitators to recovery and suggest a model of recovery for further testing and thus several theories (*theory triangulation*) were not assessed to identify the best fit of the data. By using interviews and questionnaires in this study – *methodological triangulation* - the strengths of one method help overcome the weaknesses of the other. The quantitative methods have strong reliability and validity from the use of established scales and larger numbers of participants that can overcome the difficulty of generalisability of findings from subjective qualitative methods. Similarly, the strength of qualitative methods to provide in-depth exploration of a topic can help overcome this limitation in the statistical analysis. In this way the interview data complements and adds to the questionnaire findings by elaborating and expanding on findings and suggesting the processes by which barriers and facilitators to recovery operate.

### 3.1 QUALITATIVE

Typically, qualitative studies require fewer participants (Arksey and Knight, 1999), however, views from ethnic minority groups, women and those living alone were not fully represented. The difficulties in recruiting from ethnic minority groups have been noted previously (Sheldon and Rasul, 2006) and additional methods, such as targeted recruitment via community groups (Kennelly and Bowling, 2001) may be needed. Interviewing adequate numbers of women and those who live alone was not possible in this study due to time constraints and means that findings may not be fully representative of all patient experiences.

It must also be acknowledged that there may be a self-selecting bias in the people who agreed to interviews - that the people who participated are different from those that did not. Participants may have been more motivated and interested than those who did not take part or they may have had specific points (positive or negative) about their care that they wished to raise, or have shared only particular experiences. Additionally, the possibility of bias in patients' retrospective accounts cannot be ruled out. This has implications for the generalisability of the findings to the extent that they may not wholly represent patients' experiences. There may be important barriers and facilitators to recovery that were not identified through the interviews due to these biases and thus the model of recovery proposed earlier may not be complete.

Criteria for assessing the reliability and validity of qualitative research were detailed in *Chapter 3 Methodology Section 2.4* and will be discussed in relation to this study using the four categories described by Yardley (2000). *Sensitivity to context*: many findings from this study concur with previous works and support established theoretical models. The interpretations discussed in *Chapters 4 and 5* are apparent from the data and represent the participants' perspectives. *Commitment and rigour*: all relevant themes emerging from the interviews were included in the analysis and the coding of a sub-set of interviews subjected to inter-rater reliability resulted in high agreement between raters suggesting the codes were reliable. However, as noted above the data



may not fully represent the experiences of all patients undergoing and recovering from CABG. Triangulation of data collection was also evident in the use of both patient and health professional perspectives in Phase 1 interviews and in the repeated interviews with patients over time in Phase 2. The methods of analysis chosen lend themselves to meeting the criteria of *transparency and coherence* as the coding and interpretation stages of both thematic and framework analysis are evident from the data and described in detail. The final criterion of *impact and importance* is met with the applied approach to the research taken throughout this study. Identifying barriers and facilitators to recovery offers the potential for health professionals to identify, prior to surgery, individuals who may not experience as good a recovery post-CABG than others and so target interventions and follow-up care.

### **3.2 QUANTITATIVE**

The questionnaire predominantly comprised validated scales that had been previously used with patients pre- and post-CABG so giving confidence in the reliability and validity of findings. A few of the questions were devised specifically for this study but followed the format of other large scale patient surveys (e.g., Healthcare Commission, 2005b). Although these questions did not have any validation and reliability data, similarly worded questions have been completed successfully by a large number of patients, again giving confidence in their validity and reliability of findings resulting from these questions. In addition, the questionnaire was piloted with Phase 1 participants to test ease of completion and identify any difficulties.

Response rate to Phase 2 was low and gives concern that the findings are not wholly representative of the participant population and that the proposed model may not be generalisable to all patients. Despite methods being used to increase uptake and retention to the study around half of those patients approached declined to take part. Retention was quite good but there were still a substantial number of people who did not complete follow-up questionnaires at 6-months. Despite all efforts, the number of participants taking part in the

study was lower than anticipated and this has reduced the power of the statistical calculations and, therefore, findings need to be regarded with caution. However, the goal of this study was to develop a model of recovery that would then need further testing and this was achieved.

### 3.3 LIMITATIONS

Ethnicity data were not readily available in this study and so the exact proportion of eligible patients from other ethnic groups cannot be ascertained, but population figures (Office for National Statistics, 2004) suggest they may be under-represented in this study. Although the proportion of women in the eligible sample matches the national picture of patients undergoing CABG (Society of Cardiothoracic Surgeons, 2002), fewer women chose to take part in the study and so are under-represented. Additionally, people who completed a baseline questionnaire but did not complete follow-up questionnaires had poorer mental well-being than those who did respond after-surgery. These factors have implications for interpretation of findings because the recovery of women, people from other ethnic groups and people who are more distressed may be different to that of other patients and so this study may not fully represent the experiences of all patients after CABG. The proposed model of recovery may then not be wholly accurate for these people and thus may not be generalisable to all patients undergoing CABG.

As noted in *Chapter 6 section 7* several pertinent questions could have been included in the questionnaire to enable possible covariates to be included in the analysis. These include, asking whether participants lived alone or with someone (and who), presence of co-morbidities, objective clinical status (using, for example, the Euroscore), expectations of surgery and return of symptoms post-CABG. Additionally, the perceived severity of pre-operative symptoms, perhaps together with an objective staff-scored symptom severity, would have provided an interesting aspect of recovery to consider. A comparison of patient and staff scores would also be worth investigating as that has not, as yet, been assessed in relation to angina symptoms.

The major limitation with the questionnaire findings is the low number of participants. Although sufficient for the analyses carried out, greater numbers would have provided greater power to the calculations and so give greater confidence in the findings. If additional variables, as suggested above, were included in the regression analyses as variables or covariates, more participants would be needed.

#### **4 FURTHER WORK**

There is much further work to follow-on from findings in this study. Further qualitative work is needed to replicate the findings reported here. Interviews with women, those living alone and people from other ethnic groups are needed to identify if the findings reported are also applicable to them or if there are other issues that are relevant to recovery for these groups of people. It may be interesting to also research younger people (those under 55 years for example) and their views on recovery as the experiences may be different, reflecting the differing lifestyles and daily activities (and possibly return to work issues) between different age groups.

Research with other groups of participants than those included here is also needed. Patients undergoing emergency surgery were not included as it would have been impossible to recruit them to the pre-operative part of the study. However, their experiences, as suggested by health professionals interviewed in this study, may be very different. Although it may not be possible to undertake any pre- and post-operative comparisons it would be beneficial to identify the recovery experience of these individuals, as this appears to be an under-researched area. How their experiences compare with those undergoing elective surgery would be valuable. Health professionals suggested these individuals experience a poorer recovery after surgery and to identify reasons for this and possible interventions to aid recovery would be a worthwhile area of future study. Patients undergoing redo CABG were also not included in this study. Again, it may be that their experiences of recovery are different and the

barriers and facilitators to their recovery differ slightly, an issue that does not appear to have been explored in past research.

More in-depth work on some topics is needed. Exploratory work on the issue of social support - the type, amount, timing, who it was provided by, whether it was what was wanted and what was expected - is needed. Findings from studies looking at social support are mixed and it may be that further qualitative work is needed to tease out the various elements of social support and identify what aspects of social support are relevant to recovery. The issue of expectations of surgery and recovery and their impact has yet to be explored yet is fundamental to individuals' perceived outcomes from CABG. PTSD, as a result of the experience of undergoing surgery, or a prolonged stay in intensive care has been shown to affect a substantial number of patients, its presence and impact on recovery needs further study. The influence of carers on recovery has not been considered in-depth in this research. It is likely that carers have an impact on a patients' recovery not just through social support but other mechanisms and this has not been extensively investigated and further studies are needed (Davies, 2000). Research drawing on theoretical concepts of self-efficacy may also be helpful in future examinations of recovery.

This study followed up participants for 12 months but the qualitative work revealed some participants reporting a perceived return of symptoms at this time. A longer follow-up may be needed to assess the impact of these returning symptoms on perceived recovery, quality of life, and participants views on the surgery they had undergone and whether it was still considered to be worthwhile. The role of the primary care team in recovery may be a worthwhile area of further study. Some participants reported good follow-up care from their General Practitioner (GP) and primary care team, others did not, yet it is not known if these differences affect perceived recovery in the short- and long-term. The views of GPs and district nurses, about whom participants in this study were so critical, has not been included in published research despite them being the constant healthcare team throughout the patients' diagnosis, treatment and recovery. Their views on recovery after CABG and the role they

have in it have not been investigated. Additionally, intervention studies have been sparse, and many of those published have concentrated on pre-operative education and exercise classes and found only limited benefits (Shuldham 2001; Shuldham, 2002; Goodman *et al.*, 2003; Asilioglu and Celik, 2004).

Given the difficulties in recruiting sufficient participants in this study, future UK studies may need to either take a longer recruitment period or use a multi-centre approach to ensure sufficient participants to undertake the complex statistical analyses needed to test models and the relative contributions of various barriers and facilitators to recovery using structural equation modelling. This would also give some indication of the direct and indirect contributions of these influential factors in recovery after CABG.

Although there has been much research on outcomes after CABG, there are still a number of unanswered questions and areas that have not been fully investigated. The aim of this study was to develop a model of recovery: this has been achieved but this model now requires further testing to assess its goodness of fit with patients undergoing elective, first-time isolated CABG.

## **5 RESEARCH OUTCOMES**

Two papers reporting the findings from the Phase 1 interviews have been accepted for publication together with two poster presentations on the findings at the British Health Psychology Annual Conference (see Appendix 9). Interim feedback on findings from these interviews was also fed back to the Consultant Surgeons and Patient Care Adviser at University Hospitals Coventry and Warwickshire (UHCW) NHS Trust.

It is intended to also submit Phase 2 findings for publication and presentation at relevant conferences. A report of all the findings will be presented to UHCW and RWH NHS Trusts Cardiothoracic teams. A brief summary of the findings has also been sent to all participants who requested it by ticking the box at the end of the 12-month follow-up questionnaire or asking the researcher.

## 6 RECOMMENDATIONS FOR CLINICAL PRACTICE

Several recommendations for clinical practice have emerged from this research. It was apparent from the interviews that patients who described themselves as anxious required more communication from the surgical team, particularly the consultant surgeon, to answer any queries and concerns they had and to put their mind at ease about the surgery. Such increased contact with the consultant surgeon would help ease anxieties about surgery and aid recovery, as patients would not be concerned that something had gone wrong during the surgery or worry that surgeons had found something else (such as cancer) but had not told them. Information provided by hospital or primary care staff that could also help ease anxiety during the recovery period includes advice on what symptoms were normal and expected, such as fatigue (including tiredness when bathing and getting dressed) and soreness in the chest, reassurance that gradually resuming everyday activities will not damage their heart or their stitches (a common anxiety reported by participants in this research) and practical suggestions to make sleeping more comfortable in the first few weeks.

Healthcare staff may need, prior to surgery, to identify those individuals with reported low social support and who may need practical help with carrying out daily activities. They may need such help arranged for them, to ease their anxiety of how they would manage after CABG. A source of emotional support would also be useful, and could perhaps be provided by rehabilitation classes or other peer support groups. Follow-up care provided by after-care hospital nurses was valued but for those living alone may need to be supplemented to provide a source of reassurance. It may be that patients who had undergone CABG in the past could fulfil this role and provide a positive outcome example.

It is clear from interviews in this study that most patients would appreciate and benefit from greater input from their GP and primary care team. Whilst some participants reported good, proactive follow-up care from their GP, many did not and had concerns about their recovery and surgery. The GP or practice nurse could provide a check-up a year after surgery to assess recovery and answer any queries about the procedure, return of symptoms, residual soreness and

pain, medication review and long-term outcomes. The benefit of rehabilitation exercise classes, particularly for those who described themselves as anxious people, were indicated by participants in this study. Although the local rehabilitation team contact all patients after surgery, it may be that further contact and encouragement are needed for those individuals who would benefit most and whose recovery may be slower without the benefit of the classes.

## **7 SUMMARY**

This study has contributed to the currently small body of qualitative work on patients' experiences of undergoing CABG, in particular what patients perceive a good recovery to be. Additionally, the clinical experience of health professionals has not previously been utilised. Their views on barriers and facilitators to recovery explored in this research have, together with insights from patients, been instrumental in understanding the possible processes involved. By understanding the mechanisms by which these barriers and facilitators can affect recovery at each stage of the surgical pathway, possible interventions can be devised that may help improve the outcome from CABG for the proportion of patients who do not report a good post-operative recovery.

Although much quantitative work has been conducted previously, most does not take a holistic approach to investigating recovery and so the complex interactions and mediating relationships suggested by findings in this research have not been fully explored. The proposed model of recovery suggested here aims to redress that by suggesting a possible system of barriers and facilitators to recovery that needs further work and testing. Findings from this study have also identified several recommendations for clinical practice, the majority of which can be easily incorporated into routine care without any substantial increases in time or resources.

Although there is much research still needed to better understand what constitutes recovery and the network of barriers and facilities to it, this research has added to the current knowledge base and suggested areas for future work.

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## Appendices

1. Literature search strategy
2. Phase 1 Interview schedules Patients  
Health Professionals
3. Phase 1 Questionnaire
4. Phase 2 Questionnaires Baseline  
6-months follow-up  
12-months follow-up
5. Phase 2 Interview schedules Baseline  
6-months post-surgery  
12-months post-surgery
6. Phase 2 Thematic framework and example of charting process
7. Phase 2 Baseline and 6-month correlations
8. Phase 2 Initial regression models A1 MCS  
A2 PCS  
A3 Perceived recovery
9. Research outcomes

## **Search strategy**

Search terms varied according to the MeSH and thesaurus terms used in the databases but covered the following:

- Coronary artery bypass grafting
- Recovery
- Psychosocial
- Quality of life
- Anxiety
- Depression
- Coping
- Perceived stress
- Optimism
- Mood
- Self-efficacy
- Rehabilitation
- Gender
- Age
- Ethnicity
- Cognitive functioning

## **Phase 1: Interview schedule – Patient**

### **Could you briefly tell me about your treatment so far?**

How were you diagnosed? What other treatments have you had prior to your surgery?

### **Do you feel you have recovered from your operation?**

What would you consider to be a good recovery? How would you describe what recovery means to you?

### **Could you tell me about your experiences of recovering from your operation?**

How has your recovery been going? What has been going well or not so well?

### **What has been the most difficult aspect of your recovery?**

Has there been any part of your recovery that you have found difficult?  
Any part of recovering after your operation that did not go well?

### **What has been the easiest aspect of your recovery?**

Has there been any part of your recovery that has gone particularly well/that you found easy?

## **Phase 1: Interview schedule – Health Professionals**

*The following are a list of some issues to discuss during the interview. Please raise any other topics that you feel may be relevant.*

### **From your experience, are there any factors or circumstances that are barriers to recovery after CABG?**

*For example:*

Are there any factors or circumstances that appear to promote/aid recovery?

Are different factors relevant at different phases of recovery? In what way?

Are there any particular medical issues that facilitate recovery or are a barrier to it? (e.g., operative complications, drug treatments, co-morbidities etc)

Are there any particular emotional or personality issues that facilitate recovery or are a barrier to it? (e.g., anxiety, optimism etc)

Are there any particular social or practical issues that facilitate recovery or are a barrier to it? (e.g., family situation, distance from hospital etc)

Are there any other issues that facilitate recovery or are a barrier to it?

Have there been any patients who you expected to have poorer recovery, but subsequently recovered better than anticipated?

What were the circumstances that may have contributed to this?

Have there been any patients who you expected to recover well, but subsequently had poorer recovery than anticipated?

What were the circumstances that may have contributed to this?

**Phase 1 Questionnaire**

## Questionnaire

For each question please tick one box. Don't worry if you make a mistake; simply cross out the mistake and put a tick in the correct box. Please do not write your name or address anywhere on the questionnaire.

If you have any queries about the questionnaire or would like help completing it over the telephone, please call the researcher: **Maria Dunckley on 024 7688 7189.**

Your participation in this study is voluntary. Your answers will be treated in confidence

Code number \_\_\_\_\_

### Section A

1. Are you male or female?

- Male  
 Female

2. What is your date of birth?

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3. What is your ethnic origin?

- White/European  
 Mixed  
 Asian/Asian British  
 Black/Black British  
 Chinese  
 Other ethnic group

4. What is your current marital status?

- Single  
 Separated  
 Married  
 Divorced  
 Living with partner  
 Widowed

5. What is the highest **formal qualification** you have?
- Left school before 16 years/None
  - O-level/GCSE/NVQ or equivalent
  - A-level/BTEC or equivalent
  - University degree
  - Post-graduate qualification
6. Have you been on a heart rehabilitation programme?
- Yes, and it has finished
  - Yes, but it has not finished yet
  - No, but I am starting a rehabilitation programme soon
  - No, but I do not wish to go on a heart rehabilitation programme
7. In the last 2 weeks did you require help from another person for everyday activities?
- Yes
  - No
8. Do you feel you have made a complete recovery from your heart operation?
- Yes
  - No
9. Do you feel your heart operation was worthwhile?
- Yes, definitely
  - Yes, to some extent
  - No
  - Not sure
10. How confident are you that you can manage your heart condition?
- Not at all/not very confident
  - Somewhat confident
  - Quite confident
  - Very confident

## Section B

These questions ask for your views about your health. For each of the following questions, please tick the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. **Compared to one year ago**, how would you rate your health in general **now**?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. The following questions are about activities you might do during a typical day. **Does your health now limit you in these activities? If so, how much?**

	Yes, limited a lot	Yes, limited a little	No, not limited at all
	▼	▼	▼
a <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Lifting or carrying groceries .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Climbing <u>several</u> flights of stairs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e Climbing <u>one</u> flight of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f Bending, kneeling, or stooping .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g Walking <u>more than a mile</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h Walking <u>several hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i Walking <u>one hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j Bathing or dressing yourself.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



4. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

- a Cut down on the amount of time you spent on work or other activities .....  .....  .....  .....  .....
- b Accomplished less than you would like .....  .....  .....  .....  .....
- c Were limited in the kind of work or other activities .....  .....  .....  .....  .....
- d Had difficulty performing the work or other activities (for example, it took extra effort).....  .....  .....  .....  .....

5. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

- a Cut down on the amount of time you spent on work or other activities .....  .....  .....  .....  .....
- b Accomplished less than you would like .....  .....  .....  .....  .....
- c Did work or other activities less carefully than usual.....  .....  .....  .....  .....

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. How much **bodily** pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time **during the past 4 weeks**...

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
	▼	▼	▼	▼	▼
a Did you feel full of life? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b Have you been very nervous?..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Have you felt so down in the dumps that nothing could cheer you up? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Have you felt calm and peaceful? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e Did you have a lot of energy?...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f Have you felt downhearted and low?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g Did you feel worn out? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h Have you been happy? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i Did you feel tired? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. How TRUE or FALSE is **each** of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
a I seem to get ill more easily than other people .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b I am as healthy as anybody I know .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c I expect my health to get worse .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d My health is excellent.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C

These questions ask about your feelings and thoughts during the **past 4 weeks**. Although some of the questions are similar, there are differences between them and you should treat each as a separate question.

**(Please TICK one box for each question)**

1. In the last month, how often have you been upset because of something that has happened unexpectedly?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

2. In the last month, how often have you felt that you are unable to control the important things in you life?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
3. In the last month, how often have you felt nervous and “stressed”?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
5. In the last month, how often have you felt that things were going your way?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
6. In the last month, how often have you found that you could not cope with all of the things you have to do?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

7. In the last month, how often have you been able to control irritations in your life?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
8. In the last month, how often have you felt you were on top of things?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
9. In the last month, how often have you been angered because of things that happen that were outside your control?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

## Section D

For the next set of questions, please read each question and tick the box that comes closest to how you have been feeling in the **past week**.

1. I feel tense or 'wound up':
- Most of the time
  - A lot of the time
  - Time to time, occasionally
  - Not at all

2. I still enjoy the things I used to enjoy:
- Definitely as much
  - Not quite so much
  - Only a little
  - Hardly at all
3. I get a sort of frightened feeling as if something awful is about to happen:
- Very definitely and quite badly
  - Yes, but not too badly
  - A little, but it doesn't worry me
  - Not at all
4. I can laugh and see the funny side of things:
- As much as I always could
  - Not quite so much now
  - Definitely not so much now
  - Not at all
5. Worrying thoughts go through my mind:
- A great deal of the time
  - A lot of the time
  - From time to time but not too often
  - Only occasionally
6. I feel cheerful:
- Not at all
  - Not often
  - Sometimes
  - Most of the time
7. I can sit at ease and feel relaxed:
- Definitely
  - Usually
  - Not often
  - Not at all

8. I feel as if I am slowed down:
- Nearly all of the time
  - Very often
  - Sometimes
  - Not at all
9. I get a sort of frightened feeling like 'butterflies' in the stomach:
- Not at all
  - Occasionally
  - Quite often
  - Very often
10. I have lost interest in my appearance:
- Definitely
  - I don't take as much care as I should
  - I may not take quite as much care
  - I take just as much care as ever
11. I feel restless as if I have to be on the move:
- Very much indeed
  - Quite a lot
  - Not very much
  - Not at all
12. I look forward with enjoyment to things:
- As much as ever I did
  - Rather less than I used to
  - Definitely less than I used to
  - Hardly at all
13. I get sudden feelings of panic
- Very often indeed
  - Quite often
  - Not very often
  - Not at all
14. I can enjoy a good book or radio or TV programme:
- Often
  - Sometimes
  - Not often
  - Very seldom

## Section E

Below are words that describe different feelings and emotions. Read each item carefully and then please tick the **one box** that best describes the extent to which you have felt this way during the **past few days**.

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested					
Distressed					
Excited					
Upset					
Strong					

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Guilty					
Scared					
Hostile					
Enthusiastic					
Proud					

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Irritable					
Alert					
Ashamed					
Inspired					
Nervous					



	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Determined					
Attentive					
Jittery					
Active					
Afraid					

### Section F

During the past 4 weeks was someone available to help you if you needed and wanted help? For example, if you felt very nervous, lonely or blue, got sick and had to stay in bed, needed someone to talk to, needed help with daily chores, needed helped just taking care of yourself. (Please circle one number).

*The diagram associated with this question has been removed for copyright reasons. The available responses are 1) yes, as much as I wanted 2) yes, quite a bit 3) yes, some 4) yes, a little 5) no, not at all*

*Thank you*

## **Phase 2 Questionnaires**

Baseline (pre-surgery) questionnaire

6-month follow-up (post-surgery) questionnaire

12-month follow-up (post-surgery) questionnaire

## Questionnaire

For each question please tick one box. Don't worry if you make a mistake; simply cross out the mistake and put a tick in the correct box. Please do not write your name or address anywhere on the questionnaire.

If you have any queries about the questionnaire or would like help completing it over the telephone, please call the researcher: **Maria Dunckley on 024 7688 7189.**

Your participation in this study is voluntary. Your answers will be treated in confidence

Code number \_\_\_\_\_

### Section A

1. Are you male or female?

- Male
- Female

2. What is your date of birth?

--	--	--

3. What is your ethnic origin?

- White/European
- Mixed
- Asian/Asian British
- Black/Black British
- Chinese
- Other ethnic group

4. What is your current marital status?

- Single
- Separated
- Married
- Divorced
- Living with partner
- Widowed

5. What is the highest **formal qualification** you have?

- Left school before 16 years/None
- O-level/GCSE/NVQ or equivalent
- A-level/BTEC or equivalent
- University degree
- Post-graduate qualification

6. How confident are you that you can manage your heart condition?

- Not at all/not very confident
- Somewhat confident
- Quite confident
- Very confident

### Section B

These questions ask for your views about your health. For each of the following questions, please tick the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. **Compared to one year ago**, how would you rate your health in general **now**?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. The following questions are about activities you might do during a typical day. **Does your health now limit** you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
--------------------------	-----------------------------	------------------------------

	▼	▼	▼	
a	<u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b	<u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c	Lifting or carrying groceries.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d	Climbing <u>several</u> flights of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e	Climbing <u>one</u> flight of stairs.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f	Bending, kneeling, or stooping.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g	Walking <u>more than a mile</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h	Walking <u>several hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i	Walking <u>one hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j	Bathing or dressing yourself .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of your physical health?**

All of the time	Most of the time	Some of the time	A little of the time	None of the time
--------------------	---------------------	---------------------	-------------------------	---------------------

	▼	▼	▼	▼	▼
a	Cut down on the <u>amount of time</u> you spent on work or other activities.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b	<u>Accomplished less</u> than you would like.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c	Were limited in the <u>kind</u> of work or other activities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d	Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort) ....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

- a. Cut down on the amount of time you spent on work or other activities .....  .....  .....  .....  .....
- b. Accomplished less than you would like .....  .....  .....  .....  .....
- c. Did work or other activities less carefully than usual .....  .....  .....  .....  .....

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. How much **bodily** pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very severe
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time **during the past 4 weeks**...

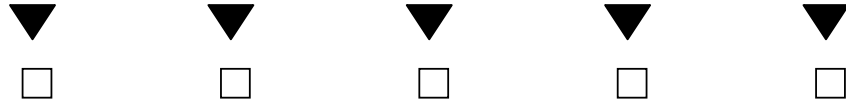
All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------



- a Did you feel full of life? .....  .....  .....  .....  .....
- b Have you been very nervous?..  .....  .....  .....  .....
- c Have you felt so down in the dumps that nothing could cheer you up? .....  .....  .....  .....  .....
- d Have you felt calm and peaceful? .....  .....  .....  .....  .....
- e Did you have a lot of energy?...  .....  .....  .....  .....
- f Have you felt downhearted and low?.....  .....  .....  .....  .....
- g Did you feel worn out? .....  .....  .....  .....  .....
- h Have you been happy? .....  .....  .....  .....  .....
- i Did you feel tired? .....  .....  .....  .....  .....

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------



11. How TRUE or FALSE is **each** of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
a I seem to get ill more easily than other people.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b I am as healthy as anybody I know.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c I expect my health to get worse.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d My health is excellent.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C

These questions ask about your feelings and thoughts during the **past 4 weeks**. Although some of the questions are similar, there are differences between them and you should treat each as a separate question.

**(Please TICK one box for each question)**

1. In the last month, how often have you been upset because of something that has happened unexpectedly?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

2. In the last month, how often have you felt that you are unable to control the important things in your life?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often



3. In the last month, how often have you felt nervous and “stressed”?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
5. In the last month, how often have you felt that things were going your way?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
6. In the last month, how often have you found that you could not cope with all of the things you have to do?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
7. In the last month, how often have you been able to control irritations in your life?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

8. In the last month, how often have you felt you were on top of things?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
9. In the last month, how often have you been angered because of things that happen that were outside your control?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

## Section D

For the next set of questions, please read each question and tick the box that comes closest to how you have been feeling in the **past week**.

1. I feel tense or 'wound up':
- Most of the time
  - A lot of the time
  - Time to time, occasionally
  - Not at all
2. I still enjoy the things I used to enjoy:
- Definitely as much
  - Not quite so much
  - Only a little
  - Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:
- Very definitely and quite badly
  - Yes, but not too badly
  - A little, but it doesn't worry me
  - Not at all
4. I can laugh and see the funny side of things:
- As much as I always could
  - Not quite so much now
  - Definitely not so much now
  - Not at all
5. Worrying thoughts go through my mind:
- A great deal of the time
  - A lot of the time
  - From time to time but not too often
  - Only occasionally
6. I feel cheerful:
- Not at all
  - Not often
  - Sometimes
  - Most of the time
7. I can sit at ease and feel relaxed:
- Definitely
  - Usually
  - Not often
  - Not at all
8. I feel as if I am slowed down:
- Nearly all of the time
  - Very often
  - Sometimes
  - Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

- Not at all
- Occasionally
- Quite often
- Very often

10. I have lost interest in my appearance:

- Definitely
- I don't take as much care as I should
- I may not take quite as much care
- I take just as much care as ever

11. I feel restless as if I have to be on the move:

- Very much indeed
- Quite a lot
- Not very much
- Not at all

12. I look forward with enjoyment to things:

- As much as ever I did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

13. I get sudden feelings of panic

- Very often indeed
- Quite often
- Not very often
- Not at all

14. I can enjoy a good book or radio or TV programme:

- Often
- Sometimes
- Not often
- Very seldom

## Section E

Please answer the following questions about yourself by indicating the extent of your agreement. Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	▼	▼	▼	▼	▼
In uncertain times, I usually expect the best .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's easy for me to relax .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If something can go wrong for me, it will.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm always optimistic about my future.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy my friends a lot.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's important for me to keep busy.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I hardly ever expect things to go my way .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't get upset too easily .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rarely count on good things happening to me .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I expect more good things to happen to me than bad.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section F

During the past 4 weeks was someone available to help you if you needed and wanted help? For example, if you felt very nervous, lonely or blue, got sick and had to stay in bed, needed someone to talk to, needed help with daily chores, needed help just taking care of yourself. (Please circle one number).

*The diagram associated with this question has been removed for copyright reasons. The available responses are 1) yes, as much as I wanted 2) yes, quite a bit 3) yes, some 4) yes, a little 5) no, not at all*

If you wish to take part in this study, please return this completed questionnaire and the signed consent form in the reply envelope provided.

*Thank you*

Phase II Baseline questionnaire v2 24/5/05

## Questionnaire

For each question please tick one box. Don't worry if you make a mistake; simply cross out the mistake and put a tick in the correct box. Please do not write your name or address anywhere on the questionnaire.

If you have any queries about the questionnaire or would like help completing it over the telephone, please call the researcher: **Maria Dunckley on 024 7688 7189**.

Your participation in this study is voluntary. Your answers will be treated in confidence

Code number _____
-------------------

If you do not wish to take any further part in this study please return the blank questionnaire in the envelope provide, or telephone the researcher quoting the code number above. If we do not hear from you in 2-3 weeks we may send you a reminder.

### Section A

1. Have you been on a heart rehabilitation programme?
  - Yes, and it has finished
  - Yes, but it has not finished yet
  - No, but I am starting a rehabilitation programme soon
  - No, but I do not wish to go on a heart rehabilitation programme
  
2. Do you feel you have recovered from your heart operation?
  - Yes, completely
  - Yes, to some extent
  - No
  - Not sure
  
3. Do you feel your heart operation was worthwhile?
  - Yes, definitely
  - Yes, to some extent
  - No
  - Not sure

4. How confident are you that you can manage your heart condition?

- Not at all/not very confident
- Somewhat confident
- Quite confident
- Very confident

5. What is your current marital status?

- Single
- Separated
- Married
- Divorced
- Living with partner
- Widowed

### Section B

These questions ask for your views about your health. For each of the following questions, please tick the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. **Compared to one year ago**, how would you rate your health in general **now**?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



3. The following questions are about activities you might do during a typical day. **Does your health now limit** you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
--------------------------	-----------------------------	------------------------------

<u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lifting or carrying groceries .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing <u>several</u> flights of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing <u>one</u> flight of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bending, kneeling, or stooping .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>more than a mile</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>several hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>one hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bathing or dressing yourself.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
--------------------	---------------------	---------------------	-------------------------	---------------------

Cut down on the <u>amount of time</u> you spent on work or other activities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Accomplished less</u> than you would like .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were limited in the <u>kind</u> of work or other activities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

Cut down on the amount of time you spent on work or other activities .....  .....  .....  .....  .....

Accomplished less than you would like.....  .....  .....  .....  .....

Did work or other activities less carefully than usual .....  .....  .....  .....  .....

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. How much **bodily** pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very severe
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time **during the past 4 weeks**...

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------



Did you feel full of life? .....  .....  .....  .....  .....

Have you been very nervous? .....  .....  .....  .....  .....

Have you felt so down in the dumps that nothing could cheer you up? .....  .....  .....  .....  .....

Have you felt calm and peaceful? .....  .....  .....  .....  .....

Did you have a lot of energy? .....  .....  .....  .....  .....

Have you felt downhearted and low? .....  .....  .....  .....  .....

Did you feel worn out? .....  .....  .....  .....  .....

Have you been happy? .....  .....  .....  .....  .....

Did you feel tired? .....  .....  .....  .....  .....

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

11. How TRUE or FALSE is **each** of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
I seem to get ill more easily than other people .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am as healthy as anybody I know.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I expect my health to get worse .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My health is excellent .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C

These questions ask about your feelings and thoughts during the **past 4 weeks**. Although some of the questions are similar, there are differences between them and you should treat each as a separate question.

**(Please TICK one box for each question)**

- In the last month, how often have you been upset because of something that has happened unexpectedly?
  - Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
  
- In the last month, how often have you felt that you are unable to control the important things in you life?
  - Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

3. In the last month, how often have you felt nervous and “stressed”?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
5. In the last month, how often have you felt that things were going your way?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
6. In the last month, how often have you found that you could not cope with all of the things you have to do?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
7. In the last month, how often have you been able to control irritations in your life?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

8. In the last month, how often have you felt you were on top of things?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
9. In the last month, how often have you been angered because of things that happen that were outside your control?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

### Section D

For the next set of questions, please read each question and tick the box that comes closest to how you have been feeling in the **past week**.

1. I feel tense or 'wound up':
- Most of the time
  - A lot of the time
  - Time to time, occasionally
  - Not at all
2. I still enjoy the things I used to enjoy:
- Definitely as much
  - Not quite so much
  - Only a little
  - Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:
- Very definitely and quite badly
  - Yes, but not too badly
  - A little, but it doesn't worry me
  - Not at all
4. I can laugh and see the funny side of things:
- As much as I always could
  - Not quite so much now
  - Definitely not so much now
  - Not at all
5. Worrying thoughts go through my mind:
- A great deal of the time
  - A lot of the time
  - From time to time but not too often
  - Only occasionally
6. I feel cheerful:
- Not at all
  - Not often
  - Sometimes
  - Most of the time
7. I can sit at ease and feel relaxed:
- Definitely
  - Usually
  - Not often
  - Not at all
8. I feel as if I am slowed down:
- Nearly all of the time
  - Very often
  - Sometimes
  - Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

- Not at all
- Occasionally
- Quite often
- Very often

10. I have lost interest in my appearance:

- Definitely
- I don't take as much care as I should
- I may not take quite as much care
- I take just as much care as ever

11. I feel restless as if I have to be on the move:

- Very much indeed
- Quite a lot
- Not very much
- Not at all

12. I look forward with enjoyment to things:

- As much as ever I did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

13. I get sudden feelings of panic

- Very often indeed
- Quite often
- Not very often
- Not at all

14. I can enjoy a good book or radio or TV programme:

- Often
- Sometimes
- Not often
- Very seldom



## Section E

Please answer the following questions about yourself by indicating the extent of your agreement. Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	▼	▼	▼	▼	▼
In uncertain times, I usually expect the best .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's easy for me to relax .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If something can go wrong for me, it will.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm always optimistic about my future.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy my friends a lot.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's important for me to keep busy.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I hardly ever expect things to go my way .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't get upset too easily .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rarely count on good things happening to me .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I expect more good things to happen to me than bad.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section F

During the past 4 weeks was someone available to help you if you needed and wanted help? For example, if you felt very nervous, lonely or blue, got sick and had to stay in bed, needed someone to talk to, needed help with daily chores, needed help just taking care of yourself. (Please circle one number).

*The diagram associated with this question has been removed for copyright reasons. The available responses are 1) yes, as much as I wanted 2) yes, quite a bit 3) yes, some 4) yes, a little 5) no, not at all*

Please return this completed questionnaire in the reply envelope provided.

*Thank you*

Phase II 6-month follow-up questionnaire v2 24/5/05

## Questionnaire

For each question please tick one box. Don't worry if you make a mistake; simply cross out the mistake and put a tick in the correct box. Please do not write your name or address anywhere on the questionnaire.

If you have any queries about the questionnaire or would like help completing it over the telephone, please call the researcher: **Maria Duncley on 024 7688 7189.**

Your participation in this study is voluntary. Your answers will be treated in confidence

Code number \_\_\_\_\_

If you do not wish to take any further part in this study please return the blank questionnaire in the envelope provide, or telephone the researcher quoting the code number above. If we do not hear from you in 2-3 weeks we may send you a reminder.

### Section A

1. Do you feel you have recovered from your heart operation?

- Yes, completely
- Yes, to some extent
- No
- Not sure

2. Do you feel your heart operation was worthwhile?

- Yes, definitely
- Yes, to some extent
- No
- Not sure

3. What is your current marital status?

- Single
- Separated
- Married
- Divorced
- Living with partner
- Widowed

4. How confident are you that you can manage your heart condition?

- Not at all/not very confident
- Somewhat confident
- Quite confident
- Very confident

### Section B

These questions ask for your views about your health. For each of the following questions, please tick the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. **Compared to one year ago**, how would you rate your health in general **now**?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. The following questions are about activities you might do during a typical day. **Does your health now limit** you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
--------------------------	-----------------------------	------------------------------

<u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lifting or carrying groceries .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing <u>several</u> flights of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climbing <u>one</u> flight of stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bending, kneeling, or stooping .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>more than a mile</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>several hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking <u>one hundred yards</u> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bathing or dressing yourself.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
--------------------	---------------------	---------------------	-------------------------	---------------------

Cut down on the <u>amount of time</u> you spent on work or other activities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Accomplished less</u> than you would like .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were limited in the <u>kind</u> of work or other activities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. During the **past 4 weeks**, how much of the time have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------

Cut down on the amount of time you spent on work or other activities .....  .....  .....  .....  .....

Accomplished less than you would like.....  .....  .....  .....  .....

Did work or other activities less carefully than usual .....  .....  .....  .....  .....

6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. How much **bodily** pain have you had during the **past 4 weeks**?

None	Very mild	Mild	Moderate	Severe	Very severe
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. These questions are about how you feel and how things have been with you during the **past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time **during the past 4 weeks**...

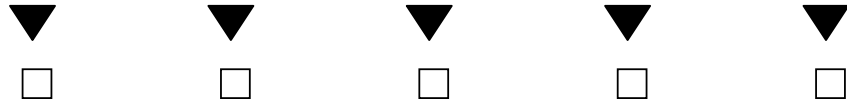
All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------



- Did you feel full of life? .....  .....  .....  .....  .....
- Have you been very nervous? .....  .....  .....  .....  .....
- Have you felt so down in the dumps that nothing could cheer you up? .....  .....  .....  .....  .....
- Have you felt calm and peaceful? .....  .....  .....  .....  .....
- Did you have a lot of energy? .....  .....  .....  .....  .....
- Have you felt downhearted and low? .....  .....  .....  .....  .....
- Did you feel worn out? .....  .....  .....  .....  .....
- Have you been happy? .....  .....  .....  .....  .....
- Did you feel tired? .....  .....  .....  .....  .....

10. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
-----------------	------------------	------------------	----------------------	------------------



11. How TRUE or FALSE is **each** of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
a I seem to get ill more easily than other people.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b I am as healthy as anybody I know.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c I expect my health to get worse.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d My health is excellent.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section C

These questions ask about your feelings and thoughts during the **past 4 weeks**. Although some of the questions are similar, there are differences between them and you should treat each as a separate question.

**(Please TICK one box for each question)**

1. In the last month, how often have you been upset because of something that has happened unexpectedly?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

2. In the last month, how often have you felt that you are unable to control the important things in your life?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often



3. In the last month, how often have you felt nervous and “stressed”?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
5. In the last month, how often have you felt that things were going your way?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
6. In the last month, how often have you found that you could not cope with all of the things you have to do?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
7. In the last month, how often have you been able to control irritations in your life?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

8. In the last month, how often have you felt you were on top of things?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
9. In the last month, how often have you been angered because of things that happen that were outside your control?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
- Never
  - Almost never
  - Sometimes
  - Fairly often
  - Very often

### Section D

For the next set of questions, please read each question and tick the box that comes closest to how you have been feeling in the **past week**.

1. I feel tense or 'wound up':
- Most of the time
  - A lot of the time
  - Time to time, occasionally
  - Not at all
2. I still enjoy the things I used to enjoy:
- Definitely as much
  - Not quite so much
  - Only a little
  - Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:
- Very definitely and quite badly
  - Yes, but not too badly
  - A little, but it doesn't worry me
  - Not at all
4. I can laugh and see the funny side of things:
- As much as I always could
  - Not quite so much now
  - Definitely not so much now
  - Not at all
5. Worrying thoughts go through my mind:
- A great deal of the time
  - A lot of the time
  - From time to time but not too often
  - Only occasionally
6. I feel cheerful:
- Not at all
  - Not often
  - Sometimes
  - Most of the time
7. I can sit at ease and feel relaxed:
- Definitely
  - Usually
  - Not often
  - Not at all
8. I feel as if I am slowed down:
- Nearly all of the time
  - Very often
  - Sometimes
  - Not at all

9. I get a sort of frightened feeling like 'butterflies' in the stomach:

- Not at all
- Occasionally
- Quite often
- Very often

10. I have lost interest in my appearance:

- Definitely
- I don't take as much care as I should
- I may not take quite as much care
- I take just as much care as ever

11. I feel restless as if I have to be on the move:

- Very much indeed
- Quite a lot
- Not very much
- Not at all

12. I look forward with enjoyment to things:

- As much as ever I did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

13. I get sudden feelings of panic

- Very often indeed
- Quite often
- Not very often
- Not at all

14. I can enjoy a good book or radio or TV programme:

- Often
- Sometimes
- Not often
- Very seldom

## Section E

Please answer the following questions about yourself by indicating the extent of your agreement. Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	▼	▼	▼	▼	▼
In uncertain times, I usually expect the best .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's easy for me to relax .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If something can go wrong for me, it will.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm always optimistic about my future.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy my friends a lot.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It's important for me to keep busy.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I hardly ever expect things to go my way .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't get upset too easily .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rarely count on good things happening to me .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I expect more good things to happen to me than bad.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Section F

During the past 4 weeks was someone available to help you if you needed and wanted help? For example, if you felt very nervous, lonely or blue, got sick and had to stay in bed, needed someone to talk to, needed help with daily chores, needed help just taking care of yourself. (Please circle one number).

*The diagram associated with this question has been removed for copyright reasons. The available responses are 1) yes, as much as I wanted 2) yes, quite a bit 3) yes, some 4) yes, a little 5) no, not at all*

Please return this completed questionnaire in the reply envelope provided. This is the last questionnaire you will receive as part of this research study. Thank you very much for all your help. If you would like a brief summary of the results of this study please tick the box below and I will post them to you once the research study is complete (summer 2007).

Would you like to receive a brief summary of the results of this study?

- Yes,
- No

Thank you

Phase II 12-month follow-up questionnaire v2 24/5/05

## Phase 2 interview schedules

### ***Baseline***

Could you briefly tell me about your treatment so far?

How are you feeling about your surgery?

What will having the surgery mean for you? What do you hope the surgery will achieve?

In your opinion, what would be a good recovery?

### ***6 months post-surgery***

Could you tell me about your experiences of recovering from your operation?

What has been the most difficult aspect of your recovery?

Has there been any part of your recovery that has gone particularly well/that you found easy?

### ***12 months post-surgery***

Could you tell me about your experiences of recovering from your operation over the last 6 months?

What has been the most difficult aspect of your recovery over the last 6 months?

Has there been any part of your recovery that has gone particularly well/that you found easy?

Key issues	Concepts	Themes	Index of codes
Diagnosis	Diagnosis	How diagnosed	How participants were diagnosed, e.g, follow-up after previous heart attack, routine check up etc. Includes what participants attributed their symptoms to, such as age, indigestion.
		Impact of diagnosis	Feelings when participants were diagnosed, confused, shock, etc.
		Views on illness	Comments reflecting participants views on their illness, causes etc.
	Impact	Impact of symptoms	How symptoms impacted on daily life, whether it was severe or not.
Preparation	Reasons for surgery	Necessity	Participants talk of how they feel they have to have surgery out of necessity, prolonging life or to avoid a heart attack.
		Regain functioning	Want surgery to maintain or regain physical functioning.
		Peer experiences	Have surgery because of the positive experiences of peers, or to avoid a negative consequence as happened to peers.
		Health professional	Health professionals advise to have surgery.
	Approach to surgery	Relaxed	Comments about being relaxed or not worried about going in for surgery.
		Anxious	Comments about being anxious, concerned or worried about going in for surgery.
		Not coming round	Comments about being concerned at not waking up after the surgery.
		During surgery	Comments about anxieties of what will happen during the surgery, e.g., waking up.
		On ward post-surgery	Concerns relating to being on ward after surgery, includes MRSA and pain.



		Visitors	Difficulties relatives may face visiting participant.
		Post-discharge	Concerns about managing at home after surgery
	Health professionals	Trust in health pros	Comments relating to trusting, or not, health professionals and any reasons as to why participants trust them.
	Emotional preparation	Information about surgery	What information participants have, or recall, about surgery provided by health professionals, peers, family/friends, BHF and other sources.
		Information about recovery	What information participants have, or recall, about recovery provided by health professionals, peers, family/friends, BHF and other sources.
		Waiting for surgery date	What it is/was like waiting for notice of surgery date to be given by hospital.
		Cancellation	Comments about cancelling surgery, how many times and how participants felt about it
Person characteristics	Active	Active	Participants report being active, always doing things, don't like to have to do nothing.
	Determined	Determined	Being determined to recover after surgery, to do what is necessary to recover, being positive and optimistic about life, surgery and/or recovery.
	Anxious	Anxious	Comments indicating that participants are often anxious about things, or worry a lot (not specific worries about surgery, more general anxieties) or that they are relaxed in general and about surgery.

Post-surgery	After care	Hospital	After care provided from the hospital, follow-up phone calls etc.
		Primary care	After care provided from the primary care team, follow-up phone calls, home visits etc.
	Social support	Emotional	Perceived emotional support provided from family and friends, visits, phone calls, and if this support not available.
		Practical	Perceived practical support provided from family and friends, with personal care, anti-embolic stockings etc, and if this support not available.
	Rehabilitation	Non attendance	Any comments on why participants did not attend rehab.
		Attendance	Specific reasons why participants attended rehab (e.g., advice from peers, health professionals).
		Benefits	Benefits of attending rehab.
		Safety	Comments about how participants feel rehab shows them how far they can push themselves, what activities are OK to do.
		Social support	Meeting peers at rehab classes.
	Recovery	Recovery	Description of recovery
Comparison to pre-surgery			Comparisons to what they were like before surgery and how they are post-surgery.
Anticipated recovery experience		Time	How long they expect recovery will take.
		Initial phase	Description of what participants feel the first few days and weeks post-discharge will be like.

		<b>Peer experiences</b>	Comments relating to what participants feel recovery will be like and how long it will take based on the experiences of peers.
<b>Actual recovery experience</b>		<b>ITU experience</b>	Descriptions of time in ITU (not ward) after surgery.
		<b>Ward experience</b>	Descriptions of time in ward (not ITU) after surgery.
		<b>Experience–initial phase</b>	Descriptions of what recovery was actually like during the first few weeks post discharge.
		<b>Recovery–middle phase</b>	Descriptions of what recovery was actually like during the first few months post discharge (after the initial phase – first few weeks).
		<b>Recovery–final phase</b>	Descriptions of what recovery was actually like after the middle phase (approx 3-6 months onwards).
		<b>Timeline</b>	Comments on how long recovery took.
		<b>Communication</b>	Communication/information needs during recovery.
		<b>Residual pain and wound healing</b>	Any comments on the surgical incisions, whether they healed well or not. Also includes comments on residual pain for the chest bone being cut (different to any on-going heart disease related problems such as breathlessness etc).
		<b>Return of symptoms</b>	Comments suggesting a return of symptoms that the participant feels are heart related. Other heart issues being investigated etc.
		<b>Approach to surgery</b>	How participants feel about having had surgery (comments from 6 and 12-months interviews).

Appendix 6: Example of charting process

Key issues				Preparation					
Concepts				Reasons for surgery				Approach to surgery	
Theme				Necessity	Regain function	Peer experiences	Health prof.	Relaxed	Anxious
ID	Age	M/F	M/S						
104	72	M	M	fear of heart attack/death if don't have op	Improve functioning		Blunt prognosis	Relaxed	
107	58	M	M	fear of heart attack/death if don't have op	Improve functioning	Positive - others better after op	Blunt prognosis		
113	75	F	M	No choice	Improve functioning	Positive - others better after op	Blunt prognosis		
111	76	M	M		Improve functioning	Negative - others not had chance, died suddenly			Anxious
121	62	M	M	fear of heart attack/death if don't have op	Improve functioning	Negative - others not had chance, died suddenly	No choice		Anxious
135	74	M	S	No choice				Relaxed	
143	66	M	S	fear of heart attack/death if don't have op	Improve functioning			Relaxed	
159	81	M	M	No choice	Improve functioning	Positive - others better after op	Positive outcome given		
229	67	M	M	No choice		Negative - others not had chance, died suddenly	Positive outcome given	Relaxed	
242	71	M	M	fear of heart attack/death if don't have op	Improve functioning	Positive - others better after op			Anxious

Appendix 7. Correlations

		FU6 SF-36 PCS	FU6 SF-36 MCS	Base SF-36 PCS	Base SF-36 MCS	Age	Gender	Education	Base Change in health	Base PSS	Base Anxiety	Base Depression	Base Optimism	Base Self Efficacy	Base Social Support	Rehab attendance	Perceived Recovery	Perceived Worthwhile	
FU6 SF-36 PCS	Coeff. Sig.	1.000 .																	
FU6 SF-36 MCS	Coeff. Sig.	.376** .001	1.000 .																
Base SF-36 PCS	Coeff. Sig.	.522** .001	.214* .038	1.000 .															
Base SF-36 MCS	Coeff. Sig.	.211* .041	.677** .001	.310** .002	1.000 .														
Age	Coeff. Sig.	-.143 .159	.249* .014	-.103 .307	.027 .790	1.000 .													
Gender	Coeff. Sig.	-.046 .652	-.166 .102	-.193 .054	-.154 .125	.061 .539	1.000 .												
Education	Coeff. Sig.	.240* .020	-.067 .520	.294** .004	.000 .996	-.369** .001	-.052 .603	1.000 .											
Base Change in health	Coeff. Sig.	-.273** .006	-.280** .005	-.494** .001	-.460** .001	-.049 .623	.054 .583	.036 .717	1.000 .										
Base PSS	Coeff. Sig.	-.358** .001	-.653** .001	-.388** .001	-.811** .001	-.127 .196	.234* .016	.059 .556	.477** .001	1.000 .									
Base Anxiety	Coeff. Sig.	-.239* .018	-.611** .001	-.195 .052	-.716** .001	-.162 .099	.093 .346	.057 .571	.313** .001	.739** .001	1.000 .								
Base Depression	Coeff. Sig.	-.447** .001	-.574** .001	-.464** .001	-.724** .001	-.067 .497	.116 .238	.009 .929	.490** .001	.739** .001	.654** .001	1.000 .							
Base Optimism	Coeff. Sig.	.418** .001	.481** .001	.142 .160	.510** .001	.018 .859	-.027 .782	-.034 .733	-.224* .022	-.568** .001	-.504** .001	-.594** .001	1.000 .						
Base Self efficacy	Coeff. Sig.	.438** .001	.467** .001	.160 .114	.427** .001	.031 .759	-.057 .569	.124 .220	-.118 .234	-.451** .001	-.468** .001	-.382** .001	.421** .001	1.000 .					
Base Social support	Coeff. Sig.	-.065 .527	-.153 .133	.074 .462	-.097 .335	.140 .154	-.003 .975	-.122 .223	-.063 .523	.086 .380	.042 .673	.037 .706	-.187 .262	-.112 .262	1.000 .				
Rehab attendance	Coeff. Sig.	-.254* .011	-.058 .573	-.204* .042	-.104 .303	.313** .001	.046 .639	-.050 .618	.090 .360	.069 .484	-.031 .756	.195* .046	-.106 .284	-.141 .155	.032 .743	1.000 .			
Perceived recovery	Coeff. Sig.	-.531** .001	-.500** .001	-.290** .003	-.323** .001	-.104 .290	.202* .039	.174 .082	.174 .077	.447** .001	.330** .001	.380** .001	-.298** .002	-.367** .001	.037 .708	.162 .098	1.000 .		
Perceived worthwhile	Coeff. Sig.	-.384** .001	-.449** .001	-.077 .449	-.249* .012	-.017 .867	.029 .772	.008 .940	.104 .290	.286** .003	.199* .042	.239* .014	-.305** .002	-.229* .020	.252** .009	.137 .164	.423** .001	1.000 .	

\*\* Coefficient is significant at the 0.01 level (2-tailed). \* Coefficient is significant at the 0.05 level (2-tailed). Significance levels rounded to 3 decimal places

## Initial regression models

*Table A1: Initial model of predictors of 6-month post-CABG SF36 MCS*

	<b>B</b>	<b>Std. Error</b>	<b>t</b>	<b>Sig.</b>
<b>Step 1</b>				
Constant	21.700	3.626	5.984	.000
Baseline SF-36 MCS	.641	.074	8.629	.000
<b>Step 2</b>				
Constant	2.730	6.869	.397	.692
Baseline SF-36 MCS	.628	.071	8.853	.000
Age	.294	.092	3.196	.002
<b>Step 3</b>				
Constant	4.250	12.419	.342	.733
Baseline SF-36 MCS	.387	.114	3.388	.001
Age	.261	.086	3.013	.003
Self-efficacy	2.203	1.026	2.148	.035
Baseline optimism	.299	.224	1.337	.185
Change in health	1.199	1.098	1.092	.278
Baseline anxiety	.230	.295	.777	.439
Baseline depression	-.817	.364	-2.243	.028
Baseline SF-36 PCS	-.005	.081	-.065	.948

\*Beta values quoted are the un-standardised coefficients

Table A2: Initial model of predictors of 6-month post-CABG SF36 PCS

Model	B	Std. Error	t	Sig.
<b>Step 1</b>				
Constant	23.666	2.977	7.949	.000
Baseline SF-36 PCS	.513	.089	5.787	.000
<b>Step 2</b>				
Constant	21.106	3.697	5.709	.000
Baseline SF-36 PCS	.483	.092	5.249	.000
Education	2.471	2.122	1.164	.247
<b>Step 3</b>				
Constant	27.827	4.944	5.572	.001
Baseline SF-36 PCS	.448	.092	4.847	.001
Education	2.493	2.090	1.193	.236
Attended rehabilitation classes	-4.111	2.091	-1.966	.052
<b>Step 4</b>				
Constant	31.173	12.717	2.451	.016
Baseline SF-36 PCS	.332	.099	3.363	.001
Education	2.797	1.904	1.469	.146
Attended rehabilitation classes	-2.553	1.913	-1.334	.186
Self-efficacy	4.238	1.216	3.484	.001
Baseline change in health	-.685	1.289	-.532	.596
Baseline anxiety	.060	.351	.171	.865
Baseline optimism	.350	.261	1.340	.184
Baseline SF-36 MCS	-.276	.133	-2.076	.041
Baseline depression	-.770	.430	-1.789	.077

\*Beta values quoted are the un-standardised coefficients

Appendix 8: Initial regression models

Table A3: Initial model of predictors of 6-month post-CABG perceived recovery

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for Exp(B)	
							Lower	Upper
Gender	1.672	1.128	2.196	1	.138	5.323	.583	48.582
Optimism	-.003	.071	.002	1	.969	.997	.868	1.145
Depression	.179	.117	2.348	1	.125	1.196	.951	1.502
Anxiety	.004	.095	.002	1	.963	1.004	.834	1.210
SF36 MCS	.009	.035	.064	1	.800	1.009	.942	1.080
SF36 PCS	-.020	.025	.619	1	.431	.981	.934	1.030
Self-efficacy	-.871	.342	6.500	1	.011	.419	.214	.818
Constant	.187	3.268	.003	1	.954	1.205		

$R^2=.23$  (Hosmer & Lemeshow),  $.27$  (Cos & Snell),  $.36$  (Nagelkerke). Model  $\chi^2(7)=30.81$ ,  $p<.0001$ .



## Research outcomes

### Publications

Dunckley M, Ellard D, Quinn T, Barlow J (2007) Recovery after coronary artery bypass grafting: Patients' and health professionals' views of the hospital experience. *European Journal of Cardiovascular Nursing* **6**: 200-207.

Dunckley M, Ellard D, Quinn T, Barlow J (2008) Coronary artery bypass grafting: Patients' and health professionals' views of recovery after hospital discharge. *European Journal of Cardiovascular Nursing* **7**: 36-42.

### Poster presentations

Dunckley M, D Ellard, J Barlow (2005) *Division of Health Psychology Annual Conference, Coventry*. Recovery after coronary artery bypass grafting surgery: the health professional perspective.

Dunckley M, D Ellard, J Barlow (2005) *Division of Health Psychology Annual Conference, Coventry*. Patients' perspectives on recovery after coronary artery bypass grafting surgery.

The rest of appendix 9 has been removed for copyright reasons. This consists of copies of the following journal articles:

- Dunckley M, Ellard D, Quinn T, Barlow J (2007) Recovery after coronary artery bypass grafting: Patients' and health professionals' views of the hospital experience. *European Journal of Cardiovascular Nursing* **6**: 200-207.
- Dunckley M, Ellard D, Quinn T, Barlow J (2008) Coronary artery bypass grafting: Patients' and health professionals' views of recovery after hospital discharge. *European Journal of Cardiovascular Nursing* **7**: 36-42.