

**Patient experiences of anxiety, depression and acute pain after surgery: a  
longitudinal perspective**

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## **Abstract**

This study sought to explore the impact of psychological variables anxiety and depression on pain experience over time following surgery. Eighty-five women having major gynaecological surgery were assessed for anxiety, depression and pain after surgery. To gain further understanding, 37 patients participated in a semi-structured taped telephone interview 4-6 weeks post-operatively.

Pre-operative anxiety was found to be predictive of post-operative anxiety on Day 2, with patients who experienced high levels of anxiety before surgery continuing to feel anxious afterwards. By Day 4 both anxiety and depression scores increased as pain increased and a third of the sample experienced levels of anxiety in psychiatric proportions whilst under a third experienced similar levels of depression.

These findings have significant implications for the provision of acute pain management after surgery. Future research and those managing acute pain services need to consider the multidimensional effect of acute pain and the interface between primary and secondary care.

**Key words:** Anxiety, depression, postoperative pain,

## 1. Introduction

Admission to hospital and the prospect of surgery is accepted as extremely anxiety-provoking (Speilberger et al. 1973, Johnson et al. 1978, Teasdale 1995, Shuldham et al. 1995, Caumo et al. 2001) resulting in behavioural and cognitive sequelae which can have far reaching effects on recovery (Wilson-Barnett & Batehup 1988, Kiecolt-Glaser et al. 1998). Numerous studies have demonstrated positive relationships between anxiety and pain, with those less anxious patients experiencing less pain (Seers 1987, Thomas et al. 1995, de Groot et al. 1997).

Studies exploring the relationship between psychological factors and post-operative pain have predominantly focused on anxiety, leaving depression relatively unexplored (Boeke et al. 1991, Shuldham et al. 1995). Boeke et al. (1991) examined the ability of 'anxiety' to predict post-operative pain in 111 patients with gallstones. In the paper they repeatedly wrote about 'psychological stress' and 'psychological variables' rather than anxiety, suggesting that anxiety represented a range of psychological variables rather than a discrete construct.

A review of 97 research reports dealing with peri-operative care identified anxiety as a main focus of research but no mention was made of depression (Leinonen & Leino-Kilpi 1999). The narrow focus on anxiety neglects depression, which have been studied extensively in patients with cancer pain (Noyes & Kathol 1986, Massie & Holland 1990, Carroll et al. 1993, White et al. 1997), chronic pain populations (Bukberg et al. 1984, Magni et al. 1990, Hitchcock et al. 1994) and sickle cell pain (Pallister 1992, Thomas et al. 2001) but remain a minority interest in acute pain.

The few researchers examining depression in the surgical pain population are Taenzer et al. (1986), Gammon & Mulholland (1996) and Gillies et al. (1999). Taenzer et al. (1986) explored the influence of a number of psychological factors on pain, including anxiety and depression, following elective cholecystectomy (n=40). Using the Beck Depression Inventory (Beck et al. 1961) they found that high levels of pre-operative depression correlated with all the post-operative pain measures, whilst pre-operative anxiety was unrelated.

A different pattern of the depression-pain relationship was observed by Gillies et al. (1999) who studied 351 adolescents undergoing elective surgery. They were surprised to find that although depression on the Hospital Anxiety and Depression scale was less than 4% pre-operatively, it rose to 29% post-operatively, and patients with depression were significantly more likely to experience moderate to severe pain post-operatively.

Interventions that enhance personal control appears to have modifying effects on both anxiety and depression; for example, a small study evaluating the effect of preparatory information prior to total hip replacement on psychological coping outcomes (Gammon & Mulholland 1996). They found that the intervention group experienced significantly less anxiety and depression, which was negatively correlated with their view of their own ability to cope. Generalisations from these findings should be cautious, as no account was taken of personality and situational factors, but they suggest that depression may be involved with the experience of post-operative pain through its ability to influence coping.

In summary, this brief review points to the important predictive roles of anxiety and depression on post-operative pain. Pain has been viewed as a multidimensional experience (Melzack & Wall 1988) resulting in pain intensity, sensation and the emotional response being influenced by the individual, but most studies neglect this model. Concerns about psychological morbidity in the surgical population have been highlighted by the publication of a report from the Royal College of Surgeons of England & The Royal College of Psychiatrists pertaining to the psychological care of surgical patients (1997). A lack of psychological care in hospital has precipitated the call for practitioners to have skills to identify psychological problems, offer psychological care and know when and how to refer for psychiatric help (House et al. 1995). This study sought to explore the impact of psychological variables anxiety and depression on pain experience over time following surgery.

## **2. Method**

### *2.1 Study design*

This longitudinal study employed several methods to explore the impact of pain on patient outcomes following surgery. An overview of the study has been reported previously (Carr 2001). This paper offers a more detailed perspective of the research questions addressing the relationship between psychological variables and pain. To achieve a greater understanding, the methods were triangulated using questionnaires, documentation, field notes, and semi-structured telephone interviews with a sub-group of the main sample (Jick 1979, Denzin 1989). Denzin (1989) describes how

methodological triangulation can take two forms; within-methods or between methods. Within method being the combination of more than one data collection method to measure the same variable. Between method is the use of two or more methodological approaches to the data collection, where the weaknesses of one approach is compensated for by the strengths of the other. For this study methodological triangulation was used to capture a more holistic and complete picture of the patients' experience of pain (Jick 1979, Bergen & While 2000, Thurmond 2001).

PLEASE INSERT Figure 1

## *2.2 Sample*

A sample of  $n=85$  was considered adequate to allow detection of a correlation coefficient 0.3 with 80% power and a Type 1 error rate of 0.05. Cohen (1977) observed that correlation's in many sociological studies are generally less than 0.50. Approval to conduct the study from the Local Research and Ethics Committee. Patients were excluded from the study if they were aged less than 18, admitted via the A&E department, or were cognitively impaired and could not understand the questionnaires.

## *2.3 Research instruments*

To measure the effect of pain on patient outcomes over time two main instruments were used: the Hospital Anxiety and Depression Scales (HADS) and the Brief Pain Inventory (BPI). A semi-structured telephone interview was used to gain further understanding of the patient's experience of pain.

### **Hospital Anxiety and Depression Scale**

The HADS is a self-assessment scale which was developed for detecting symptoms of anxiety and depression in non-psychiatric patients from a medical outpatients department (Zigmond & Snaith 1983). It contains two seven-item scales: one for anxiety and one for depression, with a score ranging from 0-21. Each item has a choice of four fixed response statements (weighted 0-3). A score of 8-10 points indicates borderline significance for either scale, but less than 8 points is insignificant. A cut-off score of 7, was used because research has shown that this is optimal for detecting psychiatric morbidity (Andrews et al. 1987, Barczak 1988). In this study, a score of 7 or was categorised as a 'case' and less than 7 as 'non-caseness'. The validity of the HADS to detect mood disorders has been documented (Shuldham 1995, Herrmann 1997) as has the reliability of the questionnaire with surgical patients (Jelicic et al. 1993, Gammon & Mulholland 1996).

### **Brief Pain Inventory**

The Brief Pain Inventory (BPI) was designed to measure the severity and impact of pain on the patient's functioning, and to capture the sensory and reactive dimension of pain (Cleeland & Ryan 1994). It is a self-report instrument containing 20 pain-related questions that focus on pain intensity and the effects of pain. The effect of pain on function is measured by asking how pain interferes with general activity, mood, walking, work, relations with others and sleep, on a 0 (does not interfere) to 10 (completely interferes) scale. The mean of these six scores can be taken to indicate the level of pain interference.

The BPI has demonstrated respectable test-retest correlations (Cleeland & Ryan 1994) and reliability in the surgical population (Zalon 1999). Validity has also been demonstrated in different groups of patients experiencing acute pain, including mammography (Kashikar-Zuck et al. 1997), and a cross-section of hospitalised patients (Barriball & While 1994).

### **Semi-structured telephone interviews**

To gain a greater understanding of the patients' response on the completed questionnaires and to increase validity, a semi-structured taped telephone interview was conducted at 4-6 weeks post-operatively. The decision to interview was determined by the average score obtained from the interference of pain on the six aspects of daily life on Day 10 (Hoyt et al. 1994). A score of less than 3.33 and greater than 6.66 on this day was chosen because it was anticipated that this would identify patients who had experienced little interference from their pain post-operatively as well as those for whom pain had been a problem.

#### *2.4 Data collection procedure*

The study aimed to explore the effect of pain on recovery. The patients' experience of pain after the high pain technological interventions (PCA and epidural) were discontinued was of particular interest, as this was when the ward staff would actively manage the patients' pain. Therefore data was collected on Day 2, 4 and 10 at 6pm. Patients discharged from hospital were given a stamped addressed envelope to return questionnaires. Telephone interviews were conducted 4-6 weeks following surgery.



## *2.5 Analysis*

Data files were set up using the Statistical Package for Social Scientists (SPSS), version 7.0 on a Toshiba Satellite 110 personal computer. Analysis of variance (ANOVA) and standard multiple regression were used to assess relationships among variables. Data was screened for the degree of skewness and kurtosis and all found to be within normal limits for distribution. Data from the taped semi-structured telephone interviews was transcribed verbatim by the researcher. The transcripts were analysed for codes and emerging themes (Polit & Hungler 1991p504). The development of themes allowed a cross-case analysis and the conceptual development of categories (Miles & Huberman 1994, p183)

## **3. Results**

One hundred and seventeen women having major abdominal surgery were invited to participate in the study. Of these 114 consented and three declined. A total of 29 patients were unable to complete the study duration for a number of reasons: twelve patients had their surgery changed from abdominal to laparoscopy or vaginal hysterectomy; two patients became unwell on day two; five patients were unexpectedly discharged before day two and ten patients did not return questionnaires for day 10. A final sample of 85 took part in the study. The mean age was 45.5 years (SD 11.24) and with a range of 27-85 years. Abdominal hysterectomy was the main operation (n=71) with the remaining women having other comparable surgery in terms of anaesthetic time and tissue damage (laparotomy and colposuspension). Thirty-seven women were interviewed by telephone between 4-6 weeks following surgery. Demographic data is presented in Table 1 and the time sequence for the data collection appears in Table 2.

PLEASE INSERT TABLE 1 & 2

This section describes the results of the anxiety and depression scores and their relationship to the pain experience. Anxiety and depression scores are described separately, as is how they changed over time. The relationship between anxiety, depression and pain is explored before considering the other variables that might be acting as predictors for anxiety and depression scores.

Anxiety and depression scores can be found in Table 3 and are graphically represented in Figures 2 and 3. Thirty-eight women (44.7%) experienced psychological distress prior to surgery. Levels of anxiety declined on Day 2 in a significant number of patients (30.6%) with a mean score of 5.64 (SD 3.57) but increased by Day 4. This suggests that other events happening at this time, such as discharge home, might influence anxiety.

PLEASE INSERT TABLE 3

PLEASE INSERT FIGURE 2 & 3

Anxiety was prevalent in this sample and for some patients persisted beyond the immediacy of surgery. Depression scores followed a similar trend except that these peaked on Day 4 declining again by Day 10, but did not return to pre-operative levels. They stayed fairly consistent throughout the post-operative period with between 21% and 30% scoring  $>7$  for depression.

To ascertain whether the anxiety/depression profile of patients made a significant impact on the mean pain scores, anxiety and depression scores were arranged in terms of 'caseness' and 'non-caseness' on Days 2, 4 and 10, and a test of between-subjects ANOVA was performed (Table 4). Anxiety was predictive of worst pain scores since patients scoring anxiety-indicating caseness were significantly greater on Days 2, 4 and 10. On Day 4 the difference in mean pain score was highly significant ( $P < 0.0001$ ). Depression was found to be a differential predictor of pain only on Day 4.

PLEASE INSERT TABLE 4

Anxiety and depression were implicated in the experience of pain, but to establish what variables might predict anxiety and depression for each of the days, multiple regression analysis was performed for anxiety and depression on Days 2, 4 and 10.

Stepwise regression analysis was performed as this is considered to give the best predictive equation and is a compromise between forward or backward entry (Tabachnick & Fidell 1996).

Repeated measures analysis of variance with time acting as covariance was performed to identify which independent variables accounted for the greater amount of the variance for anxiety and depression over time. Variability measures of  $R^2$ , adjusted  $R^2$ , F and P are not reported as these measures are based on a transformed variable. The variables most predictive of anxiety over time were depression and walking (Table 5). Depression accounted for 38.0% of the variance for anxiety, and walking had a

negative beta coefficient of -37.7%. The variables most predictive of depression over time were anxiety (contributing 30.6% of the variance for depression) and mood 38.6% (Table 6). Studies assessing the ability of the scale to discriminate between anxiety and depression have been inconclusive (Aylard et al. 1987, Razavi et al. 1989, Chaturvedi 1991 cited Herrmann 1997). Findings from this study suggest that the sub-scales were discriminatory of mood.

PLEASE INSERT TABLE 5 & 6

Thirty-seven women participated in a semi-structured telephone interview, between 4 and 6 weeks after surgery. Of this sample 15 had done particularly well and 22 had not done so well. The biographical characteristics of the sub-sample were very similar to those of the main sample. Transcripts were coded, then grouped into themes, which formed six minor categories; expectations of pain, describing the pain, analgesia, helping pain, increasing pain and telling a professional. To allow themes to be considered across cases, an analytic summary matrix was developed (Miles & Huberman 1994, p183). This process led to the development of five further categories, revealed in Figure 4. It can be seen that one of the major conceptual categories was the 'emotional dimension'. This was particularly important as it gave meaning and understanding to the questionnaire results. In particular this concept linked the themes related to expectations about pain, the affect associated with, being prepared and discharge home.

PLEASE INSERT FIGURE 4

#### **4. Discussion**

The results of this study confirmed that the prospect of surgery is an extremely stressful event. In general patients' anxiety scores were elevated prior to surgery with nearly half the sample experiencing considerable anxiety scores that fell into the criteria for "caseness". Understandably anxiety was more marked than depression with significant fewer patients scoring as 'cases' for depression than the normal population range of 11-22% (Herrmann 1997). It was likely that the advent of illness and the fear and anxiety associated with surgery were reflected in these scores.

Pre-operative anxiety and depression scores were predictive of post-operative scores suggesting, unsurprisingly, that those patients who enter hospital feeling anxious or depressed will continue do so post-operatively. It is difficult to say exactly how long depression existed before surgery since women with gynaecological problems experience significant disturbing symptoms that can affect activities of daily living (Hunter 1992, Liao et al. 1995). Often the co-morbidity exists in chronic disorders but there appear to be no studies that have explored depression in the chronically ill pre-surgical population and considered its long term trajectory during recovery

Anticipating surgery is understandably a big source of anxiety but one would expect that levels would subside after surgery. The present results revealed that nearly a third of the sample experienced high levels of anxiety on Day 2, and significantly more pain than those patients who were less anxious. This finding of pre-operative anxiety being predictive of post-operative anxiety experience is now a relatively consistent finding (Taezener, et al 1986; Winefield et al. 1990, Boeke et al. 1991, Thomas et al. 1995).

Both anxiety and depression scores continued to increase after surgery as pain increased and a third of the sample scored as 'cases' for anxiety and just under a third for depression. These patients also experienced elevated pain scores, but none of the entries in the nursing notes remarked upon this relationship. If nurses failed to identify anxiety pre-operatively, this was also the case after surgery. A general acceptance of anxiety surrounded the surgical event, but little appeared to be done to lessen the potential effects of this unpleasant feeling. Nurses working in a surgical setting may become immune to the psychological distress generated by the procedure and no longer recognize the patients' distress. High patient turnover, increased part-time staff and lack of continuity of care may all contribute to an erosion of the nurse-patient partnership. Superficial nurse-patient relationships could make patients feel less able to discuss their anxieties and lead to the distress continuing unrecognized. One patient remarked on the positive effects of getting to know the nurse she thought was assigned to her.

'You felt you could talk to them a bit more because you had got familiar them...you knew that they would be able to tell you about mobility. It gave me a lot more confidence that I could ask about things. [P82]

The relationship between anxiety and pain has previously been identified (Johnston & Vogeleson 1993, Thomas et al. 1995) and psychological stress, measured over several post-operative days, revealed that anxiety and pain are positively correlated (Seers 1987). It is important to emphasise that these findings do not explain whether anxiety and depression make pain worse or whether the experience of pain leads to anxiety and

depression (Desbiens et al. 1996, White et al. 1997). Whilst it is not possible to identify the nature of the relationship between anxiety, depression and pain from the data, it seems from patients report that these different variables had a cumulative effect.

“Well I think that my assessment of it was that they tried to get me up and about a little too fast for me and they also tried to make me eat and I was very reluctant to do. It really upset me...they are giving you drugs which are pain relieving and they may not work quite ...you know...you discover what’s best for you. It’s a combination of things and one is going to get a bad day or two. I did feel quite down and I think those were the reasons why”. [P64 Day 4]

Levels of pre-operatively psychological distress may be related to the expectation of pain after the operation and this in turn may have been influenced by previous painful surgical procedures. This suggestion is supported by the following report from a patient:

“It’s been a lot less painful than I thought it would be...

I had my appendix out two years last August and that was appalling. The pain that I suffered then was absolutely horrendous. I remember crying”...[P44]

Predictive models can be helpful to identify which variables might be important, and studies using predictive models have identified anxiety as a contributor to post-

operative pain on Day 3 (Winefield et al. 1990, Boeke et al. 1991). Taenzer et al. (1986) found that anxiety and depression were predictive of all outcome variables: pain, mood and analgesic requirement with surgical patients. Gillies et al. (1999) found that depression influenced pain on the third post-operative day, in a sample of adolescent patients. The importance of these variables is highlighted in studies exploring the development of chronic pain. In a sample of 371 hospital patients who were all identified as having acute pain, depression was found to be a predictor of the development of chronic pain (White et al 1997). It is reasonable to expect that many women in this study were experiencing concerns about fertility, the possible diagnosis of cancer, worries about sexuality and the overall effects of surgery on their lives. Mental health promotion has been advocated as one of the most effective interventions when it intervenes at crucial points in people's lives (NHS 1997). Nurses are in a key position to recognize the psychological needs of these women and develop supportive strategies or referral during this time.

## **5. Conclusion**

Emotional variables such as anxiety and pain influences pain experience. Anxious patients had significantly higher pain scores than less anxious patients, and changes in anxiety were significantly related to changes in pain. Depression scores did not follow the same pattern, but suggest that surgical patients are susceptible to becoming depressed at four days following surgery. A longitudinal study is required to follow



patients over an extended period of time to determine the long terms consequences of pre and post psychological variables on physical and emotional well being.

Pre-operative anxiety and depression scores predicted postoperative experience, suggesting that patients who enter hospital feeling anxious or depressed are predicted to continue to do so post-operatively. It is likely that patients' expectations about their pain, and concerns about its continuation or effect on their lives contributed to the degree of anxiety on Days 4 and 10, and depression on Day 4. For some patients, the long waiting times between the onset of symptoms and being referred to a specialist may mean that they have to cope with difficult physical symptoms. However, with the passing of time and persisting symptoms, anxiety may give way to depression. In spite of the fact that patients experienced such significant emotional sequele there was no acknowledgement of this made by nurses in their documentation. This strongly suggests that nurses require education in order that they might anticipate the psychological consequences and the impact upon patients' experience of post-operative-pain and recovery. A finding already highlighted in other studies (White et al 1997, Runshagen et al 1999). The ability of nurses to identify patients, who are particularly anxious and target interventions, or appropriate referral, would be highly desirable to ameliorate the unwanted impact of this state.

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