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Testing the effectiveness of a nursing intervention in relieving pain following day surgery

Anne Dewar^{a,*}, Kenneth Craig^b, Janice Muir^c, Colm Cole^c

^a School of Nursing, University of British Columbia, T254-2211 Wesbrook Mall, Vancouver, BC, Canada V6T 2B5

^b Department of Psychology, University of British Columbia, Vancouver, BC, Canada

^c St. Paul's Hospital, Vancouver, BC, Canada

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Abstract

The purpose was to determine if a nursing intervention pre-operatively with post-operative follow up would improve levels of pain, and the extent of common symptoms such as nausea and constipation. Two hundred and twenty-two surgical day patients undergoing arthroscopic knee surgery, mammary reduction, hernia repair and anal surgery completed pain diaries post-operatively. Nurses telephoned the intervention group on post-operative days 1, 2 and 3 with advice and support. Results indicate that the telephone intervention decreased patients post-operative pain. Patients do not always understand oral or written information given at discharge and there is a need for specific follow-up advice and information.

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1. Introduction

The number of procedures performed in ambulatory settings is increasing as a result of technological advances, economic necessity, and the desirability of avoiding hospital stays. Despite the success of these procedures and the many benefits of this setting, there are indications that patients often experience problems following discharge that require self-management skills as well as advice and follow-up care. The potential problems identified include: pain, nausea, vomiting and sleeplessness. Of these problems, pain is reported to be the most significant issue and is reported to be the major reason that most patients contact their general practitioners after surgery [1–3]. Several studies have indicated that patients need information prior to ambulatory surgery [4,5] and decreased physical and psychological trauma has been linked to pre-operative patient education [5]. One limitation of day surgery is

that nurses have restricted time for pre- and post-operative teaching about pain management and other aspects of care.

Information sessions prior to the day of surgery, such as at the time of booking or in pre-assessment clinics, tend to be preferred by patients [6] and reduce pre-operative concerns [7], but all patients do not have these opportunities. Information that is given in the immediate pre-operative and/or post-operative time periods may not be remembered [8,9], because of anxiety prior to surgery and because recovery from anesthesia combined with analgesic medications may affect the patient's ability to absorb and remember information. Patients have varying requirements for pre-operative information, as some prefer substantial information and others very little or none [8]. Researchers have identified that although generally pre- and post-operative teaching is effective some patients want more professional advice and information than they received [10,11]. Dissatisfaction with the level of information and amount of information received has been linked to experiencing more post-operative symptoms, [11] particularly pain [12,13]. Oberle [13] found that patients need and want personalized information following day surgery.

* Corresponding author. Tel.: +1-604-822-7465; fax: +1-604-822-7466.

E-mail address: dewar@nursing.ubc.ca (A. Dewar).

As there are practical and economic limitations to providing patient teaching in the immediate pre- and post-operative situations in ambulatory surgery, some authors have explored providing information via post-operative telephone calls [8,10]. These calls can address patients' concerns and provide personalized support when the stress of pending surgery is over and their concerns are more apparent. Studies about the effects of patient teaching following day surgery are limited. One example [14] reported that patients want specific details about practical management of their everyday life following surgery and with shortened hospital stays this information is not readily available.

Telephone follow-up after day surgery is both an economical means of providing teaching and support that cannot be provided during the limited in-patient stays and a method of gathering data. Mitchel's [15] extensive literature review of adult patients' perceptions of day surgery lists several examples of telephone follow-up studies. These included determining patient's perceptions of day surgery, identifying common post-operative complications, and determining when patients felt able to resume normal activities [5,16–23].

1.1. Purpose and questions

The purpose of this study was to determine if a pre-operative intervention with post-operative follow-up would improve patients' pain management following discharge from day surgery. The patient intervention focused on advice about pain management and on managing the side effects of pain-relieving medications. The following research questions were addressed:

- 1) Do patients who receive an educational intervention experience lower levels of pain than those patients who do not receive an educational intervention?
- 2) Is there a difference between the two groups (those who receive an educational intervention and those who do not) with respect to the presence of symptoms experienced after discharge?
- 3) Does the rate of pain reduction over time differ between the two groups?
- 4) Does the level of impact of the symptoms vary between the two groups?
- 5) Does the incidence and level of impact of symptoms vary over time between the two groups?
- 6) Does the amount of medication consumed differ between the two groups?
- 7) Does the amount of medication consumed over time differ between the two groups?
- 8) What are the effects of patient characteristics (age, gender, ethnicity, education, level of anxiety, type of surgery) on their pain, symptoms and medications consumed?

2. Patients and methods

2.1. Population

All patients over a 5 month period, undergoing selected surgical procedures were approached, in a day surgery unit of a large urban hospital and invited to take part in the study. There were four major surgical groups: anal surgery, hernia repair, arthroscopic surgery, and, in the last 5 weeks of the study, mammary reduction and enhancement were added to increase the number of patients. These patient groups were selected because substantial pain is associated with these procedures. Within each surgical group there were variations in procedures. For example, anal surgery consisted of patients undergoing hemorrhoidectomy, anal repair, fistulotomy, and the removal of anal warts, tags, and cysts. The arthroscopic group included mainly patients undergoing arthroscopic knee surgery viz. anterior cruciate ligament repair (ACL), arthroscopy, meniscectomy. Also included in the arthroscopic group were bunionectomy and one rotator cuff and three Achilles tendon repairs. Hernia repairs were inguinal, ventral, umbilical, abdominal and incisional.

2.2. Pre-operative procedure

All patients were given a letter explaining the study and invited to take part. Patients belonging to 15 surgeons were involved in the study. Two surgeons in the surgical unit did not want their patients to be part of the study so their patients were not included. Patients who were under 19 years of age, could not read or write English, or were not willing to fill out the pain diary or be telephoned at home were excluded. If the patient consented to be in the study the nurse researcher checked a pre-determined list of random numbers to determine if the patient was randomly assigned to the control or intervention group. The random numbers were selected using a randomized block design to ensure that equal numbers of control and intervention participants were scheduled for each of the four main surgical types.

After obtaining informed consent, a nurse researcher asked both intervention and control groups to complete the Spielberger State Trait Anxiety Inventory (State) [24] and the Brief Pain Inventory [25] and collected demographic data. Patients were also asked if they had anyone at home to help them after surgery and how much pain they expected to have. The intervention group was given pre-operative teaching about post-operative pain control and a pamphlet about pain management following surgery. The pamphlet was based on the guidelines for management of acute pain post-operatively from the Agency for Health Care Policy and Research [26]. The nurse researcher spent

between 10 and 15 min talking with each patient. Interviewing time was influenced by how much time was available prior to surgery.

During the pre-operative session, both intervention and control groups were given pain diaries and asked to complete them for four consecutive evenings, beginning with the day of surgery (day 0). The pain diaries asked them to indicate their level of pain, how many pain-relieving medications they were taking, the extent to which they were having problems with side effects such as nausea, vomiting, constipation, dizziness, grogginess and fatigue and how pain was affecting them. The diary also included, for both groups, questions about the helpfulness of the pain management advice given and the helpfulness of the written instructions. Diaries given to the intervention group also asked how helpful they found the follow-up telephone calls. To assist with compliance, patients were given stamped envelopes addressed to the researchers.

2.3. Post-operative procedure

Following surgery, both groups were given the usual post-operative teaching by the nurses in the surgical day unit, which included an instruction sheet with the surgeon's preferences for post-operative management. The researchers did not see the patients after surgery.

2.4. Telephone follow-up

The intervention group was telephoned on post-op days 1, 2 and 3 by the same nurse researcher seen in the day surgery unit. If necessary, repeat telephone calls were made until the nurse spoke to the patient. The nurse researcher reviewed a standardized protocol with the patient to assess the patient's pain and pain management. The protocol also assessed nausea, vomiting, constipation, dizziness and grogginess. If any of these symptoms were present, the nurse advised the patient how to manage the problem. For example, patients who had been prescribed acetaminophen with 30 mgs of codeine but not achieving satisfactory pain relief were advised to include ibuprofen as part of their pain management providing they had taken this medication before and they did not have any allergies. If the patient's pain was severe and not able to be relieved, then the patient was advised to phone their surgeon or general practitioner. During the telephone calls made on days 2 and 3, the nurse again reviewed the standardized protocol.

The patients in the control group also were phoned on day 2 and reminded to complete their pain diaries. To minimize any treatment interference, the control group was advised pre-operatively that they would be telephoned on day 2, and care was taken not to give them any advice about pain management.

All patients were telephoned on day 5 post-surgery and asked if they still had pain, if they were taking pain-relieving medications and if they still had any side effects, such as constipation, nausea, vomiting, dizziness, grogginess or fatigue. These data were recorded by the nurse and were not included in the pain diary but were part of the data analysis.

2.5. Measurement

Pain was measured by a numerical rating scale where no pain was 0 and 10 was the worst pain imaginable (the Brief Pain Inventory). This has been used in numerous studies and has established reliability and validity across a number of patient populations, was used both pre-operatively and post-operatively [25].

2.6. Demographic data

Of the patients who met the study criteria only three refused. Of the 254 patients who were enrolled, 16 became protocol failures because post-operatively they had to stay overnight in the hospital, they had left their diaries at the hospital or they subsequently were admitted to another facility. Of the remaining 238 patients, 222 mailed their completed pain diaries to the researchers. Table 1 represents the numbers of patients in each surgical group.

There were no differences between the control and intervention groups with respect to the demographic data. There were 135 males and 87 females in the sample, (Table 2). Many more males than females had anal surgery. The average age of the intervention group was 42.5 years and of the control group 41.4 years. Most of the patients were Caucasian (80.6%) with the remaining 19.4% describing their ethnic origins as Chinese, South Asian, Filipino, Latin American, Japanese or another nationality. The level of education ranged from primary school to graduate degrees (Table 3). Over half of the sample was married or living common law (53.4 %), while 31.7 % were single and the remaining 14.9% were widowed or divorced. When asked if they had anyone at home to care for them for a few days after their surgery, 86.9% of the patients indicated they did.

Table 1
Types of Surgeries by percentage

Hernia	14.4% (32)
Mammary reductions and enhancements	16.2 % (36)
Arthroscopies	31.1% (69)
Anal surgeries	38.3% (85)
Total	100% (222)

Table 2
Demographic data by gender

Gender	Control	Intervention	Total
Male	51.9% (70)	48.1% (65)	100% (135)
Female	55.2% (48)	39 (44.8%)	100% (87)

Table 3
Level of education

Highest level of education	Control	Intervention	Total
Elementary School	2.5% (3)	0.96% (1)	4
Secondary School	28.8 % (34)	21% (22)	56
Trades Certificate/Diploma	33% (39)	48% (50)	89
University diploma/degree	35.6 % (42)	29.8% (31)	73
Total	100 % 118	100% (104)	222

2.7. Data analysis

Data were analyzed using SPSS (STATISTICAL PACKAGE FOR SOCIAL SCIENCES) computer software. Descriptive statistics were used to summarize the prevalence, severity, and effects of pain, the presence of other symptoms, pre- and post-intervention, and to profile patient characteristics (age, gender, marital status, presence of someone at home to help after surgery and level of education).

Two-sample *t*-tests were used to determine the differences between the control and experimental groups with respect to pain severity at each time point (from day 0 to 3). For all interval scale outcome items measured pre and post-intervention two sample *t*-tests were also used to compare the two groups with respect to the change score between each pair of time points (e.g. day 0–day 3). This analysis was also done for those items measured at day 5. For categorical variables (e.g. symptoms, and helpfulness of instructions, use of medications (yes, no), χ^2 tests were used to compare control and experimental groups.

3. Results

Using the SPSS, independent *t*-test analyses were performed to provide analysis for the following questions.

Question 1 addressed whether patients who received an educational intervention experienced lower levels of pain than those patients who did not receive an educational intervention.

From day 0 (the day of surgery) to day 3, the control and the intervention groups did not differ significantly with respect to level of pain (as measured by the item how much pain do you have right now) but by day 5, the

intervention group had significantly less pain than the control group ($P = 0.04$). The mean level of pain for the intervention group at day 5 was 2.85, S.D. 2.30 and for the control group was 3.55, S.D. 2.63. Fig. 1. indicates the mean level of pain by day of surgery.

Questions 2 and 5 addressed differences between the intervention and control groups with respect to the presence of other symptoms experienced after discharge and changes in symptoms over time. There was no difference between the intervention and control group regarding experiencing other symptoms, which included nausea, vomiting, constipation, fatigue, dizziness and grogginess.

Question 3 addressed whether the rate of pain reduction over time differed between the two groups. The research found that the level of pain reduction between the two groups differed over time. Between day 0 and 2 ($P = 0.033$) and day 0 and 3 ($P = 0.016$) the intervention group experienced a significant decrease in pain over the control group. There was also a significant difference between the groups regarding change in pain when moving. Between day 0 and 1 ($P = 0.021$) and day 0 to 2 ($P = 0.057$) and day 0 to 3 ($P = 0.061$), the intervention group experienced less pain on moving than the control group.

Question 4 asked if the impact of the symptoms varied between the two groups. Impact included mood, sleep, relations with others, walking ability and concentration. On day 1 there were no differences between the control group and intervention group but by day 2 some difference had begun to become apparent, as the intervention group had better scores on their relations with others ($P = 0.05$) and on their concentration ($P = 0.01$). By day 3, the differences between the control and intervention groups approached significance for level of pain, pain when moving and relations with others. Of note on day 3 there were significant differences between the intervention and the control group regarding the

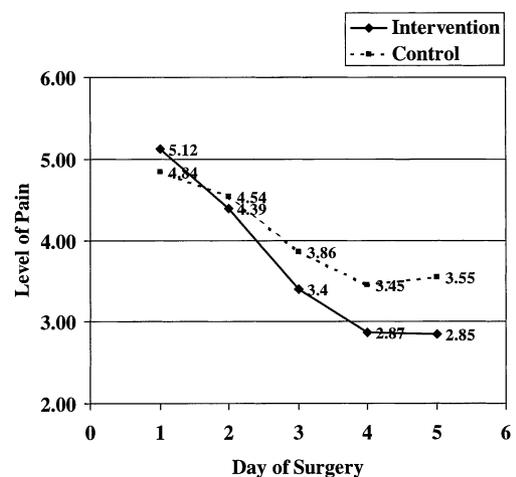


Fig. 1. Mean levels of pain by day of surgery.

effect of pain on mood ($P = 0.038$), walking ability ($P = 0.047$) and concentration ($P = 0.041$).

Questions 6 and 7 assessed the amount of medications consumed and if that amount differed over time between the two groups. There was no difference between the two groups regarding the number of medications consumed. On day 0 there was no difference between the intervention and control group with respect to the amount of relief patients obtained from pain relieving medications, but over time the intervention group indicated that they experienced more relief than the control group. By day 1 the difference between the intervention and the control group was significant at ($P = 0.028$) by day 2 at ($P = 0.042$), and it remained so by day 3 by ($P = 0.047$). The symptoms of nausea, vomiting, constipation, fatigue, dizziness and grogginess decreased over time and did not vary between intervention and control groups (See Table 4).

Question 8 assessed the effect of the patient characteristics (age, gender, ethnicity, education, level of anxiety, type of surgery) on patient's pain, other symptoms and number of medications consumed. The data obtained pre-operatively also asked how much pain they expected to have post-operatively. Patient characteristics did not impact on pain, other symptoms and numbers of medications consumed. There was no relationship between level of anxiety prior to surgery and level of pain experienced post-operatively. There were weak correlations between how much pain they had expected to have post-operatively and the amount of pain that they experienced over the 3 post-operative days.

There were no differences between the intervention and control groups prior to surgery as measured by the BPI [25]. Nor were there differences regarding the use of other coping methods used post-operatively between the two groups.

3.1. Helpfulness of instructions

In their diaries, patients in both groups were asked how helpful they found the written instructions. Of the intervention group 59.8% indicated that they found the written instructions helpful or very helpful as opposed

to 36.8% of the control group ($P < 0.0008$). However, of the intervention group, 7.8% (nine persons) indicated that they had not read them and one person stated he/she did not receive them. In the control group 13.2% (15 patients) indicated that they did not read the instructions and 14.9% (17 patients) indicated they did not receive any written instructions.

3.2. Pain management advice

The question on the pain diary related to pain management advice revealed positive results. Although 57.3% of the intervention group found the advice helpful as compared with 46.9% of the control group, a surprising 13.6% of the intervention group indicated that they did not receive any pain management advice. The question for the intervention group assessing the helpfulness of the telephone advice yielded overwhelming support as 79.6% said that they had found it helpful or very helpful.

There were no differences between the two groups with respect to other symptoms experienced or with respect to rates of recovery from the symptoms experienced. Table 3 reports on the total sample and the percentages of those patients reporting symptoms by post-operative day.

The anecdotal comments of patients were that they appreciated the telephone call and the support and concern of the pain research nurses and commented positively in their pain diaries. It was difficult to determine if patients gave the same message over the telephone as they did in their diaries.

4. Discussion

Patients appear to benefit significantly from telephone advice about how to manage their pain following day surgery. In this research the advantages of detailed advice were not immediately apparent as the differences in pain levels between the control and intervention groups were not clearly evident until day 5, although by day 3 the differences between the two groups approached significance with the intervention group

Table 4
Symptoms other than pain in the total sample by (%)

	Day 0	Day 1	Day 2	Day 3
Nausea	43.2 % (96/222)	27.2 % (59/217)	20.4 % (45/221)	14.5 % (32/220)
Vomiting	19.4 % (43/222)	7.8 % (17/217)	3.2 % (7/221)	1.8 % (4/220)
Constipation	21.7 % (48/221)	38.2 % (83/217)	37.6 % (83/221)	30.0 % (66/220)
Fatigue	72.5 % (161/222)	66.8 % (145/217)	59.3 % (131/221)	48.6 % (107/220)
Dizziness	51.1 % (113/221)	36.6 % (79/216)	20.8 % (46/221)	19.2 % (42/219)
Grogginess	63.3 % (140/221)	42.8 % (92/215)	28.1 % (62/221)	24.2 % (53/219)

experiencing less pain than the control group. As the patients reported that they felt unable to concentrate on the information very well during the first post-operative day, it could be that as time passed and their concentration improved they benefited more from the telephone advice. Law [8] also reported that patients had difficulty remembering verbal advice following day surgery. Questions developed over time, as the patients recovered and experienced problems in relation to their surgery, their pain, and the side effects of pain relieving medications. This contrasts to Moran's [10] findings that patients preferred earlier phone calls post-operatively and these calls were more effective than those that occurred later.

Although there were differences in pain levels between the intervention and control groups, there were no differences in the amount or level of other symptoms such as constipation. The focus of the intervention was on pain; it could be that these other symptoms were not affected by the intervention. Interestingly, there was no correlation between medications consumed and level of pain experienced but there was a relationship between the number of medications consumed and the presence of other symptoms such as constipation, fatigue, grogginess, dizziness and nausea. These symptoms decreased over time, as one would expect, but there was no difference between the intervention and control groups. It seems that pain affected the control group more than the intervention group and the intervention group got more relief from medications than the control group.

Significant numbers of patients reported fatigue. This is similar to the findings of Oberle [13] who reported that fatigue following day surgery persisted for several days. Other studies [27,28] reported that nausea and vomiting may persist for several days. Patients in this study did not report undue stress from these symptoms. It was difficult to determine the origin of these symptoms because most patients were prescribed acetaminophen with codeine, which has side effects of nausea and dizziness. Thus, it is difficult to distinguish symptoms that were part of the recovery and those associated with the medications.

The intervention group received more relief from pain relieving medications than the control group beginning at day 1, even though they did not take more medications. It could be that they felt supported and knew that support and advice were readily available, which impacted on the level of pain. Pain had less impact on the intervention group than on the control group in terms of mood, concentration, and relations with others. Again, it took time for the impact to be evident, as the differences between the intervention and the control groups were not apparent until day 3. Post-operative follow-up that occurs later in the post-operative recovery may be important, although Moran [10] found that

patients preferred telephone calls nearer the time of surgery rather than later.

In contrast to Payne, Ghia, Levin and Wikles [29] this research did not demonstrate a relationship between pre-operative levels of anxiety and post-operative levels of pain. It could be that since both groups of patients had talked to the nurses, even briefly, their level of anxiety was reduced. Mitchell [30] found that 72% of patients' anxiety is reduced by being near and speaking to the nurse.

The time of discharge is a difficult one for patient teaching. The nurses in the day surgery unit had many demands on their time. They were admitting patients prior to surgery and caring for them as they returned from the recovery room as well as discharging them. Time for additional information and teaching is limited. As well anecdotal information from the patients in this study indicated that they were not alert enough to absorb substantial information and would not have been able to think of future concerns or problems. Hence the follow-up telephone calls were very helpful. Information provided well in advance is helpful and Mitchell [30] found that 99% of patients required both written and verbal information prior to ambulatory surgery and most wanted it 1–3 weeks prior to surgery.

The advice must be specific enough so that it can be helpful, for example, explaining to patients the importance of keeping their pain under control. The need for explicit advice has been determined in other studies. Fox [14] found that patients did not want to be told to 'take it easy' and receiving a list of instructions from the surgeon was inadequate to meet their requirements for information. They required more specific information and instruction about exactly what they could and could not do.

Patients in this research reported that written instructions were helpful, but not all patients followed written instructions. Some patients claimed that they were given advice that was not clear and two people misunderstood the information that they were given. Patients reported that they did not always read the information that was provided. Fewer of those in the intervention group (7.8%) than in the control group (13.2%) reported that they did not read the written information. The telephone calls possibly provided motivation to read information but also the intervention group received two types of written instructions—the pamphlet given by the nurse researcher and the surgeon's instructions given by the hospital. They were not asked to differentiate between the two in the diaries. This suggests that either the additional pain management pamphlet or the pamphlet in conjunction with the telephone support assisted the patients to find the written instructions more helpful. It could be that multiple messages were beneficial for the intervention group.

Mitchell [30] found more extensive written information-reduced patient's contact with a general practitioner but also found that a small percentage of patients (7%) did not read all the information.

When the patients, both intervention and control groups, stated they did not remember being given any advice about pain management, it could be that the patients had difficulty understanding what is meant by the term advice or that the question is too ambiguous. Law [9] (p. 358) also identified that some patients did not understand what was meant by the expression 'What advice were you given?' This has important implications for future surveys in assessing what patients think of post-operative advice.

Patients in this study were a heterogeneous group. Some of the procedures may have been more painful than others. Even within the four categories listed in Table 1, there was variation in the procedures performed. The research relied upon the patients' self reports of the number of medications that they were taking and the amount of pain and other symptoms experienced. Some of the patients had had surgery before and we did not factor this into the study. We did not intervene during the post-operative discharge process and we do not know if the follow-up instructions were given to family members or to patients alone. The nurses in the day surgery unit were under pressure to discharge patients as they were not able to keep them overnight and this may have contributed to variation in the discharge information that patients received. For the most part, the nurse who gave the pre-operative teaching instructions telephoned the patients at home, so a rapport was established. In practice this may not be realistic with nurses schedules and the numbers of operations performed.

5. Conclusion

Telephone intervention was effective in impacting on patient's pain post-operatively. Patient teaching needs to include information about the side effects of medications and how to manage them and about the importance of seeking help or advice. This study lends strong support that patients need accessible follow-up care and that telephone advice is an acceptable means of providing such advice. There is a need for resource persons to assist patients by re-enforcing and clarifying instructions and providing encouragement and even emotional support. This information suggests that teaching needs to be re-enforced when patients actually have problems and those at home need access to follow-up information as well as coaching and encouragement.

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