Pain management following discharge after ambulatory same-day surgery

JUDY WATT-WATSON RN, PhD[1], FRANCES CHUNG MD, FRCPC[2], VINCENT W. S. CHAN MD, FRCPC[3] and MICHAEL MCGILLION RN, PhD (candidate)[4]

[1]Professor, *Faculty of Nursing, and Centre for the Study of Pain, University of Toronto, Ontario,* [2]Medical Director, *Ambulatory and Combined Surgical Units, and* Professor, *Department of Anesthesia, University of Toronto, Toronto Western Hospital, Ontario,* [3]Associate Professor, *Department of Anesthesia and Pain Management, University of Toronto, University Health Network, Ontario and* [4]PhD Candidate, *Faculty of Nursing, University of Toronto, Ontario, Canada*

Correspondence
Judy Watt-Watson
Faculty of Nursing
University of Toronto
50 St George Street
Toronto
Ontario
Canada M5S 3H4
E-mail: j.watt.watson@utoronto.ca

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Aim and background Same-day surgeries are becoming routine for many surgical procedures. However, the degree to which patients need help with pain management at home following laparoscopic cholecystectomy (LC), shoulder, or hand ambulatory day surgery has received minimal examination. This study examined pain and related interference, analgesic use and adverse events, complications and resources utilized, and adequacy of postdischarge information at four time periods.
Methods Data were collected from 180 patients by telephone interviews at 24, 48 and 72 hours, and 7 days after discharge. Patients ($n = 78$ hand, 48 shoulder, 54 LC surgery) were on average 41 years old.
Results For all patients, worst 24-hour pain was reported as moderate to severe at all time periods. Using repeated measures ANOVA demonstrated that shoulder patients had significantly more pain and overall pain-related interference, particularly in sleep and work, from 24 hours to day 7 than did hand or LC patients. The main analgesic taken was acetaminophen (paracetamol) with codeine 30 mg; 50% took no analgesia from 72 hours. About 20% experienced analgesic adverse events within 72 hours, mainly constipation and nausea. Only $\leq 6\%$ used non-pharmacological strategies. Bleeding (4%) and sore throat (11%) at 24–48 hours were identified as complications; six patients (4%) called their physician. Most patients received no information about analgesic use with inadequate pain relief and/or adverse events.
Conclusions Despite the considerable pain reported across all time periods, analgesic use and other interventions were minimal. Adverse events, which were problematic for some, may explain why patients stopped analgesics despite pain. These data support further research on more effective pain interventions and related education for day-surgery patients after discharge.

Keywords: ambulatory day surgeries, laparoscopic cholecystectomy patients, orthopaedic, pain

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Introduction

Ambulatory surgery constituted 60–70% of all surgery performed in North America in the 1990s and is increasing (Chung *et al.* 1997, Marley & Swanson 2001). Technological advances in anaesthesia as well as early recovery, rapid turnaround times in surgical services, and fiscal restraints have shifted the focus of postoperative care to the home setting for greater number of patients (Kleinbeck & Hoffart 1994, Bumgarner & Evans 1999, Watkins & White 2001). People undergoing complex and potentially more painful surgical procedures may be discharged within a few hours to recover at home. Although some argue that the incidence of inadequately treated postoperative pain at home is generally low, this observation has not been supported to any great extent (Chung *et al.* 1997, Rawal *et al.* 2001). Limitations to existing research in this area include small sample sizes and a focus predominantly on the first 24 hours after surgery that does not necessarily include pain management.

Increasing evidence indicates that inadequately controlled pain after ambulatory surgery is commonplace. In a telephone survey of patients ($N = 102$) on the second and fourth day after ambulatory surgeries, McHugh and Thoms (2002) found that the majority of patients (82%) left the hospital in pain and that most had pain (88%) throughout the 4-day postoperative study period; 21% rated their pain at home as severe. Previously, Leith *et al.* (1994) reported that 70% of patients described their postday-surgery pain as unacceptable. Moreover, patients (35%) have reported moderate–severe pain at home despite taking analgesics (Chung *et al.* 1997). Patients in Oberle *et al.*'s (1994) sample ($N = 294$) were surprised at the intensity of their postoperative pain. Nearly all of these patients reported moderate to severe pain, which continued for some to the fourth day. Similarly, Bradshaw *et al.* (1997) reported that pain for their same-day surgical sample ($N = 60$) was a major postoperative concern.

Unrelieved pain for these patients has well-documented consequences. In a systematic review, Joshi (1999) found that uncontrolled pain after ambulatory surgery was commonly associated with (1) increased symptoms of nausea, anxiety, and delirium, (2) prolonged postanaesthetic care unit (PACU) stay, (3) delayed discharge from ambulatory surgical facilities; (4) readmission, and (5) delayed resumption of normal activities at home. Coley *et al.* (2002) reported, from a retrospective survey of medical records ($N = 20\,817$), that almost 6% of patients had unanticipated readmissions within 30 days after same-day surgery. Pain was the reason given for readmission for the largest group of these patients (38%).

Common ambulatory day surgeries include laparoscopic cholecystectomy (LC) and shoulder or hand surgery. However, minimal data are available in the literature that document the incidence of unrelieved pain and related management approaches for these patients. Although 6 hours of observation before discharge on the same day has been well established as sufficient and safe for LC patients (Keulemans *et al.* 1998), unrelieved pain has been documented with small samples. In Parlow *et al.*'s (1999) sample ($N = 22$), 80% reported moderate to severe pain following discharge the day of cholecystectomy, and 48% at noon the next day. Poorly managed pain may have contributed to the nausea after discharge that almost 50% experienced. No data were collected beyond the immediate 24-hour postoperative period. Moreover, Kleinbeck and Hoffart (1994) found that patients ($N = 19$) reported soreness and fatigue on their first day and that they managed their symptoms by trial and error because of a lack of information. In several studies, pain was a major reason for inpatient admission or readmission of same-day LC surgical patients (Fiorello *et al.* 1996, Taylor *et al.* 1996, Hession 1998).

Research describing pain management at home after hand or shoulder surgery is also minimal. When Rawal *et al.* (2001) compared analgesic preparations, they found that pain after ambulatory hand surgery can last longer than 3 days. Lewis and Buss's (2001) sample of 106 ambulatory shoulder surgical patients (60% arthroscopy; 40% open surgeries ± arthroscopy) reported being very satisfied with their pain control (96%). However, no standardized pain ratings were reported, and 14% indicated that they would have preferred to remain in hospital for nursing care, including more intensive pain management.

Pain control has been considered crucial for patients' successful recovery after surgery (Treen *et al.* 1991, Agency for Health Care Policy and Research 1992, Watt-Watson *et al.* 1999). Despite evidence supporting multimodal strategies for effective pain management, data suggest that effective pain management is problematic for ambulatory surgical patients after discharge home. Moreover, pain relief strategies frequently are not addressed in the written discharge instructions for these patients. The degree to which they need help managing pain at home, including analgesic needs, following LC, hand, or shoulder ambulatory surgery has received minimal examination.

The purpose of this study was to examine the postoperative pain, pain-related interference with usual

activities, and analgesic use of LC, hand, and shoulder surgery patients at four periods during the first week after discharge. Additional data were collected to determine analgesic-related adverse events, postdischarge complications, related use of resources, and the adequacy of the information given to patients. These data will be used to develop an education intervention to help these patients manage pain at home following discharge.

Methods

Design and setting

This prospective, descriptive study with repeated measures (RM) was implemented using a convenience sample from the day-surgery unit of one large metropolitan hospital affiliated with a university. A sample size of 60 patients from each of three surgical groups was thought large enough to permit a 15% drop out rate and still allow sufficient information to give investigators direction for a future educational intervention. Ethical approval was granted by the University Research Services Office and the Research Ethics Board of the hospital involved.

Sample

Data were collected from 180 patients over a 9-month period from August 2001 to April 2002. Consenting patients were included if they were (1) having their first LC or shoulder or hand surgery, (2) being discharged the same day as the surgery, and (3) able to understand, read, and speak English. Patients were excluded if (1) they had previous similar surgeries, (2) their surgery/postoperative recovery was preoperatively known to be complicated, or (3) they were unable to understand, read, and speak English. Eight patients who were approached refused to participate because they were too busy or not interested in another study.

Outcome measures

Pain and pain-related interference

The Brief Pain Inventory-Short Form (BPI-SF) is a well-established multidimensional instrument that has been used to measure the severity of pain and its impact on functioning (Cleeland & Syrjala 1992). Reliability for English, French and Chinese versions of the BPI has consistently been above 0.85 (McDowell & Newell 1996). Discriminant validity in pain severity has been demonstrated between groups of patients having different pain locations, with metastases, and related to analgesic requirements. Components of the BPI have been adopted by the American Pain Society Quality of Care committee as one of the outcome indicators for monitoring the quality of pain management (American Pain Society Quality of Care Committee 1995).

This measure consists of 9-items, which include two pain prevalence and location questions, four pain intensity numerical rating scales (NRS), one pain relief NRS, and an interference subscale of six NRS. The interference subscale can be used to measure how much pain interferes with everyday function related to mood, walking and general activity, work, relations with others, and sleep. Scores from the six NRS of function are summed for a total score; the mean is used to indicate the level of interference. Higher scores for the NRSs indicate greater pain or interference because of pain. One additional NRS was added to measure the 'unpleasantness' of the worst pain; this anchor has been established as a valid and reliable affective label (Gracely *et al.* 1978).

Analgesic and non-pharmacological interventions

Analgesic data from patients' self-reports were collected at five time periods: baseline before surgery, and at 24, 48 and 72 hours, and 7 days after surgery. Patients were asked to identify the type and dose of analgesia taken in the previous 24 hours. Analgesic doses were converted to standardized parenteral morphine equivalents (Hardman & Limbird 2001). Patients were also asked at each of the five time periods to report any non-pharmacological treatment(s) they used in the previous 24 hours.

Adverse events, complications, and related use of resources

In the Post-discharge Inventory, patients were asked at the four interviews about analgesic-related adverse events such as constipation, nausea or vomiting, and drowsiness. They were asked to report any complications such as bleeding, fever, sore throat or incision infection, and any subsequent use of resources such as contacts with physicians, unplanned emergency department visits, or hospital admissions.

Adequacy of discharge information

At the last interview on the seventh day, patients were asked about the adequacy of pain management information they received prior to discharge (American Pain Society-Patient Outcome Questionnaire, APS-POQ). Four questions focused on the clarity and adequacy of discharge information about managing pain, using analgesics, and alternatives if they experienced poor

pain relief or adverse events. One open-ended question asked about how patients could have been helped more with their care and these comments are integrated throughout the paper to add clarity to the quantitative results.

Procedure

In the 2-hour waiting period before the surgical procedure, the Research Assistant (RA) informed eligible patients about the study. All patients who agreed to participate were given verbal and written explanations of the study, including their rights, safeguards to preserve anonymity, and risks and benefits of participation. Patients consenting to participate completed questionnaires (see Table 1) for baseline demographic and previous pain information and for baseline BPI-SF scores. The protocol allowed the RA to offer the telephone number of a hospital health professional to any participant who requested help with pain or adverse events.

Postoperatively, patients completed the same BPI-SF questionnaire by telephone with the RA to determine their pain and analgesia needs at home at four time periods: 24, 48 and 72 hours, and 7 days after surgery. Patients were also asked about adverse events, complications, and use of resources at each of the four time periods. At the final telephone interview, patients were asked about the adequacy of their discharge information, particularly their analgesic management instructions, and about how they could have been helped more with their care. Prior to discharge, patients were given a copy of the questionnaires to follow in each interview.

Data analysis

Descriptive statistics were used to describe the sample's demographic characteristics and the type of analgesics and non-pharmacological strategies that they used. As well, descriptive statistics (i.e. averages, SD, proportions) were used to summarize outcome variable data at all time periods. A mixed RM ANCOVA was performed to determine differences in pain, interference, and analgesic use in terms of surgical group (i.e. between subjects main effect) and time (i.e. within subjects main effect). Patient's sex and birthplace were used as covariates. Separate ANOVAs were performed for pain and related interference, and post hoc comparisons using Tukey's Honestly Significant Difference test were used to determine the source of the difference. An alpha of 0.05 was the level of significance used for all analyses.

Results

Demographics and baseline pain information

The sample included 54 patients having LC surgery, 78 having hand surgery, and 48 having shoulder surgery (see Table 2). Overall, patients' ages were similar, with an average age being 42 ± 15 years. Patient's sex depended on the type of surgery. Although 80% of hand and shoulder patients were Canadian born, most LC patients were born either in Canada (39%) or in Europe or Hong Kong (41%). Hand patients received regional anaesthesia, shoulder patients received general anaesthesia, with some having a postoperative block for pain, and LC patients received general anaesthesia only. On average, patients, regardless of surgical group, said prior to surgery that they expected to have moderate pain after surgery (6 ± 2), although 42% expected severe pain (≥7). At baseline, LC patients had significantly less pain and related interference that the other groups (see Table 2).

Pain

WORST 24-hour pain

When an RM-ANCOVA was conducted, significant group by time interactions and main effects of group

Table 1
Data collection procedure

Measures	*Outcomes*
Preoperative: 2-hour period before ambulatory surgery	
Demographic and previous pain history information	
Brief pain inventory-short form	Pain, interference
Postoperative: after discharge home by telephone	
24, 48 and 72 hours	
Brief Pain Inventory-Short Form	Pain, interference
Post-Discharge Inventory part I	Adverse events, complications, resource use
Day 7	
Brief pain inventory-short form	Pain, interference
Postdischarge inventory part 1 and II	Adverse events, complications, resource use, information needs

Table 2
Patient characteristics and baseline pain data

Surgical group	*Sex (%)*	*Age (years) X ± SD*	*Pain expected postsurgery (0–10) X ± SD*	*Worst pain in prior 24 hours (0–10) X ± SD*	*Pain-related interference (BPI-I)† X ± SD*
Hand	Female (51)	43 ± 15.6	6 ± 3	4 ± 4	16.4 ± 15.1
Shoulder	Male (85)	38 ± 14.4	6 ± 2	4 ± 3	13.9 ± 12.7
Laparascopic cholecystectomy	Female (78)	43 ± 13.3	5 ± 2	2 ± 3*	7.7 ± 12.3**

*Significantly less pain than other groups [$F(2) = 11.18$, $P < 0.00$].
**Significantly less pain-related interference than other groups [$F(2) = 6.17$, $P < 0.003$].
†Brief pain inventory-interference subscale.

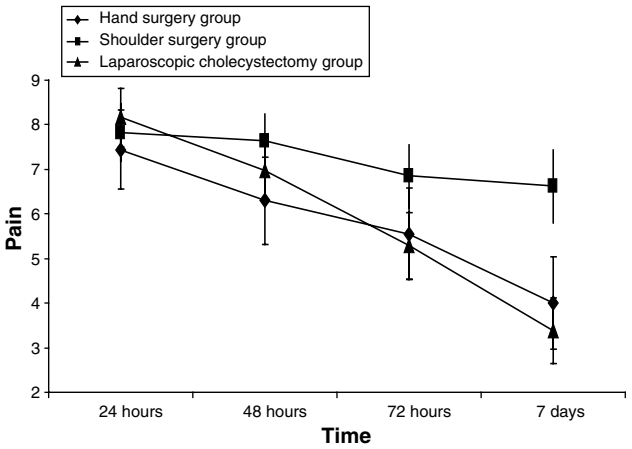

Figure 1
24-hour WORST pain levels by time period for three groups.

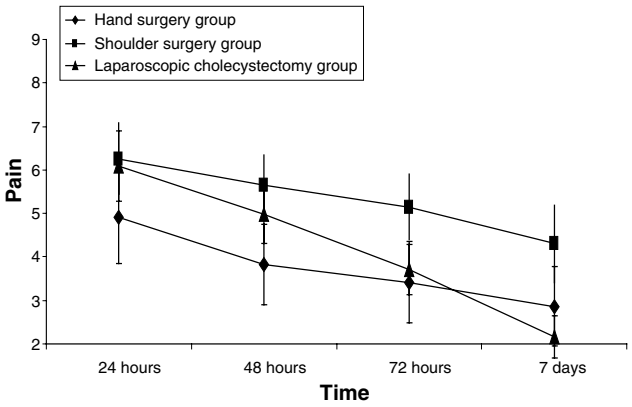

Figure 2
Pain NOW when move by time period for three groups.

and time interactions were evident. A significant difference was demonstrated across the four postoperative time periods between-groups [$F(6, 216) = 5.53$, $P < 0.000$] and within-groups [$F(6) = 8.76$, $P < 0.000$] (see Figure 1). Pain decreased more quickly for hand and LC patients, particularly at 72 hours and 7 days. Shoulder patients had the most pain to day 7 (X ± SD = 7 ± 2; 0–10 scale). It is clinically significant that at day 7, the worst pain in the previous 24 hours was reported as severe (≥7, 0–10) by 31% of hand patients, 55% of shoulder patients, and 8% of LC patients. An RM-ANOVA demonstrated a significant difference between groups for the unpleasantness of this pain [$F(6, 208) = 5.48$, $P < 0.00$], and scores decreased more quickly for hand and LC patients, particularly at day 7. For the total sample, within-subject pain was significantly reduced from 24 hours after discharge (8 ± 2) to day 7 [5 ± 3; $F(6) = 8.75$, $P < 0.00$]. No effect of sex or birthplace was demonstrated on any pain scores.

Pain NOW

After an RM-ANCOVA was performed, a significant difference across the four postoperative time periods was also demonstrated for pain NOW 'on movement' at the time of the interviews between-groups [$F(6, 216) = 3.67$, $P < 0.002$] and within-groups [$F(6) = 4.09$, $P < 0.001$] (see Figure 2). Hand and LC patients had a greater decrease in pain, particularly at 72 hours and 7 days. It is clinically significant that on day 7, this pain was severe (≥7) for 20% of hand patients and 21% of shoulder patients, but not for any LC patients. Mean scores for the total sample changed significantly from 24 hours (6 ± 3) to day 7 [3 ± 3; $F(6) = 4.09$, $P < 0.001$]. Although a significant difference between groups was also demonstrated for pain NOW 'at rest' scores [$F(6, 216) = 2.22$, $P < 0.04$], scores overall were in the mild range (≤ 3). Statistically, LC patients had a greater decrease in pain, particularly at 72 hours and 7 days, and total group means changed significantly from 24 hours (3 ± 3) to day 7 [2 ± 2; $F(6) = 2.31$, $P < 0.03$].

Average pain

Scores for average pain were similarly different by group across time [$F(6, 216) = 3.84$, $P < 0.001$], particularly for the LC group. Total group means changed significantly, but all were within the mild range from 24 hours (3 ± 3) to day 7 [3 ± 2; $F(6, 216) = 3.84$, $P < 0.001$].

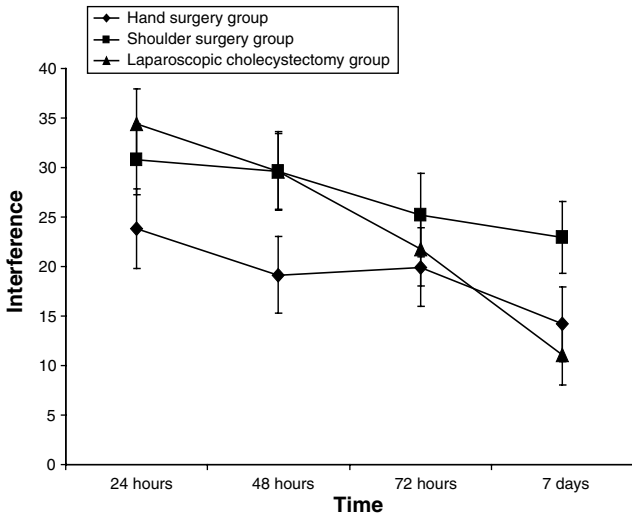

Figure 3
Brief pain inventory (BPI-I) total scores by time period for three groups.

Interference with usual activities

When an RM-ANCOVA was conducted, significant group by time interactions and main effects of group and time interactions were evident. A significant difference was demonstrated across the four postoperative time periods for pain-related interference with usual activities (BPI-I) between-groups [$F(6, 216) = 6.38$, $P < 0.000$] and within-groups [$F(6) = 10.1$, $P < 0.000$] (see Figure 3). Shoulder and LC patients had more overall interference to 48 hours, and shoulder patients had the highest scores to day 7 (X ± SD = 22.9 ± 11.9). In particular, a significant difference between groups was evident for interference with both sleep [$F(6, 216) = 2.73$, $P < 0.01$] and work [$F(6, 214) = 3.79$, $P < 0.001$]. Sleep interference decreased more rapidly for hand and LC patients than for shoulder patients, who had moderate interference to day 7 (X ± SD = 5.4 ± 2.8). Work interference decreased quickly to being minimal for LC patients, but remained in the moderate range to day 7 for both shoulder (X ± SD = 6.1 ± 3.3) and hand patients (X ± SD = 4.2 ± 4). For the total sample, the change in the mean was significant from 24 hours after discharge (29.8 ± 14.38) to day 7 [15 ± 4; $F(6) = 10.11$, $P < 0.00$]. No effect of sex or birthplace was demonstrated on interference scores.

Analgesic and non-pharmacological interventions

Analgesic doses, using morphine equivalents, taken in the previous 24 hours across the four time periods were minimal. No significant between-group or within-group main effects were demonstrated when an RM-ANOVA was conducted. Total group mean values ranged from 8 ± 8 mg at 24 hours after discharge to 5 ± 6 mg on day 7. Although, over 50% of all patients used some analgesia up to 72 hours, 50% took no analgesia after 72 hours. It is significant that 54% of shoulder patients used analgesics on day 7. Acetaminophen (paracetamol) with codeine 30 mg was by far the most commonly used analgesic, including on day 7. Acetaminophen with oxycodone 5 mg was used by 7–14% of the hand patients, 6–10% of the shoulder patients, and 2–6% of the LC patients; controlled release oxycodone was used by only 1–4% of the hand patients. Non-steroidal anti-inflammatory drugs (NSAIDs) alone were used by 2–10% of patients. NSAIDs along with an opioid/acetaminophen combination were used by 1% of hand patients consistently, by 2% of LC patients at 72 hours, and by shoulder patients both at 24 (23%) and 72 hours (17%). Mean values for pain relief from analgesic medications ranged from 61 to 73%; although scores were highest for LC patients, no significant between-group or within-group main effects were demonstrated when an RM-ANOVA was used.

Non-pharmacological strategies were rarely used at any of the time periods after surgery by any patients (1–6%). A cold treatment was used at some point in the week by 4% of shoulder patients and 3% of hand surgery patients. Elevation and positioning were used by 1% of hand patients at 24 hours.

Adverse events and complications

From 24 to 72 hours, 40% of the total sample reported experiencing some adverse event, mainly constipation (24 hour = 12%, 72 hour = 17%), nausea (14%, 8%), and/or drowsiness (22%, 11%). Of the 22% of patients reporting drowsiness at 24 hours, 23% rated it as severe. Only LC patients took any laxatives, including 1% at 24- and 72-hours, and 4% at 48 hours. Patients' qualitative comments indicated a considerable number had experienced constipation and/or nausea in their previous experience with acetaminophen with codeine and therefore, were using it minimally after this surgery to prevent these from happening again. Complications identified included bleeding (4%) and sore throat (11%). Few patients (4%) called their physician about these events. No patients asked to be referred for help with adverse events.

Adequacy of discharge information

The majority of patients (69%) reported receiving enough information to take care of themselves after

surgery, although 23% of shoulder patients did not feel this way. The majority (73%) also said they felt prepared to manage their pain at home. Instructions about taking medications were absolutely clear for 55%. However, instructions about changing the timing and amount of medications if they were not effective or caused side-effects were not given or were unclear for 56%, with the shoulder group representing the highest percentage (61%). Several patients stated that they felt uninformed about what to do 'if something happens' or 'pills don't work'. Other patients volunteered that their medications 'didn't do anything for my pain after day 1 so I stopped them'.

Discussion

Considerable pain was reported across all days, particularly for shoulder surgery patients whose activities, work, and sleep were affected. These data suggest that pain management for hand, shoulder, and LC patients was inadequate, and they support other studies' findings concerning same-day surgical samples.

Pain and interference

Although severe pain decreased across the week, almost a third of hand patients and over half of the shoulder patients reported severe pain on the seventh day. Moreover, considerable pain-related interference in activities, including sleep and work, continued for shoulder patients to day 7. It is noteworthy that almost half of our sample expected to have severe pain postoperatively and may not have sought help because of this expectation. Oberle *et al.* (1994) also reported that nearly all their divergent same-day surgery patients ($N = 294$) reported moderate to severe pain immediately after surgery that lessened steadily to the fourth day; however, patients with pain on the third and fourth postoperative day rated it as moderate to severe. Moreover, these patients reported that they had expected pain postoperatively, but were surprised by its intensity. Similarly, Bradshaw *et al.* (1997) found that for their day-surgery patients ($N = 60$), pain was paramount among key postoperative concerns that included wound problems, bathing, exercise, return to work, and resumption of other activities of daily living.

Analgesic and non-pharmacological interventions

Despite patients' pain, analgesic use was inadequate and inappropriate, particularly for the shoulder surgical group, up to and including day 7. Analgesic doses, using morphine equivalents, taken in the previous 24 hours across the four time periods were minimal. As well, most patients were taking acetaminophen with codeine 30 mg, which is inappropriate for severe pain and is known to cause dose-related problematic adverse events such as constipation and nausea. Controlled release opioids and NSAIDs were minimally used, although recent evidence indicates that they can provide effective pain relief for ambulatory surgical patients (Reuben *et al.* 1999, Barden *et al.* 2002).

Adverse events were a concern. Several patients commented that they did not fill their analgesic script or stopped taking the analgesic because of previous or current experiences with constipation and/or nausea. It is significant that half of the patients stopped taking analgesics at 72 hours despite moderate pain. Almost no patients were taking a laxative at any time period. Patients identified that more effective analgesics would have helped them, although some expressed fears of becoming addicted if they took more. Similarly, Keulemans *et al.* (1998) found that 50% of their patient sample ($N = 32$) stopped their pain medication by 24 hours after LC surgery despite moderate to severe pain at 1 week (78%). Further research is needed about whether the problem lies with patients' reluctance to take any opioid or with taking one that previously has caused adverse effects and given only moderate relief from pain. Previous research with other surgical patients indicated that patients need education about the importance of relieving acute pain, need for regular dosing, and fears of addiction (Watt-Watson *et al.* 2001). Education is also needed about non-pharmacological strategies, as they were rarely used at any time period in this study.

Preliminary intervention studies using pre-emptive and multimodal models for home analgesia have had positive results (Marley & Moline 1996, Joshi 1999, Tong & Chung 1999, Montgomery & Donovan 2002). For example, Michaloliakou *et al.* (1996) trialled a multimodal approach for preventing postoperative pain following ambulatory LC surgery ($N = 49$). The treatment group received an opioid and ketorolac 45 minutes prior to surgery and a local anaesthesia prior to incision, whereas the control group was given saline at both times. Anaesthesia as well as postoperative pain and nausea management were standardized, and pain and nausea were assessed at regular intervals. Significantly more patients in the treatment group were without pain on arrival to the PACU (57% *vs.* 4%, $P < 0.001$) and reached satisfactory anaesthesia discharge scores sooner than did controls (281 ± 12 minutes *vs.* 375 ± 19 minutes, $P < 0.005$). Hekmat *et al.*

(1994) compared the effectiveness of giving analgesia to hand surgical patients ($N = 33$) when they reported pain *vs.* when they reported return of sensation to the affected limb. More effective pain control was achieved when patients received analgesia with the return of sensation.

Adequacy of discharge information

Preoperative teaching about pain management, including adverse events, was inadequate for a number of patients in these day-surgery groups, although overall responses were positive. At day 7, the majority of our sample said they received enough information to take care of themselves and manage their pain at home. However, about a quarter of shoulder patients disagreed. Moreover, a considerable number of patients did not receive clear instructions about taking medications (45%) or about changing medications that were ineffective or caused adverse events (56%). Again, the shoulder group reported receiving less clear information in these areas than the other groups. Patients' comments about what would be helpful included the need for clearer instructions that would be given at a time when they were not feeling drowsy or sick. Bradshaw *et al.*'s (1999) systematic review also found that a considerable number of same-day surgical patients reported not receiving any information about what pain to expect after surgery or how to manage pain at home (60%). In contrast, Kamming *et al.* (2003) found that 86% of their same-day surgical sample ($N = 1495$) reported at 24 hours postsurgery that their instructions about changing the amount and timing of medications were absolutely clear. The difference between these findings and our study may relate to our data collection time of 7 days after surgery when the inflammatory response had increased, patients' usual activities were being resumed which may have increased pain, and their analgesia may have been discontinued because of adverse events and/or fears of addiction. Therefore, further research is needed to determine the most appropriate strategies and timing for an educational intervention for these patients.

Conclusion

The purpose of this study was to examine the postoperative pain, the pain-related interference with usual activities, and the analgesic use and related side-effects that LC and hand and shoulder surgery patients experienced at four periods during the first week after discharge. Considerable pain was reported across all days, particularly for shoulder surgical patients whose activities, work, and sleep were affected. Analgesics being used were inadequate for many patients despite pain. Most patients were not given information about changing medications if relief and/or adverse events were problematic.

The results of this study point to the crucial need for careful preparation of patients having hand, shoulder, or LC surgery, in relation to pain management strategies. Successful discharge and effective postoperative pain management at home require preoperative education, discharge planning with respect to expectations of pain, and pain management after surgery. Patients' previous experiences with pain and problems with management need to be explored and options for current management examined. In particular, management of adverse events such as constipation and nausea need to be discussed and included in educational materials.

Data from this study identify important gaps that need to be included in any effective educational intervention for these patients. Therefore, future research will examine the impact of an educational intervention that addresses these gaps, in order to assist these patients with pain management at home following discharge.

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