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Problems in self-management of analgesics after outpatient shoulder surgery

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ABSTRACT

INTRODUCTION. Surgical outpatients are instructed in the use of analgesics post-operatively, but many fail to obtain adequate pain control at home. This study describes how the medication taken related to the prescribed medication and to pain intensity to improve recommendations of drug choice and scheduling. Also, we describe which errors occurred to suggest improvements in patient education and adherence.

METHODS. Data were extracted from a study of dexamethasone in day-case arthroscopic shoulder surgery. Patients were recommended paracetamol 1 g four times daily and as needed: ibuprofen 600 mg up to 1,800 mg daily and morphine 10 mg up to 60 mg daily. Patients reported pain intensity and analgesic use until the third post-operative day.

RESULTS. A total of 75 patients were available for analysis, and 33 patients (44%) reported an average pain intensity < 3 (by numerical rating scale 0-10) during the first three days. Paracetamol was taken as recommended by < 50%, and adherence was poorer in patients with higher average pain scores. The maximal daily dose was exceeded for paracetamol (n = 7) and ibuprofen (n = 14) due to too many daily doses or medication of other brand names or strengths than the patients were used to. In total, 32 patients had rescue doses between midnight and 6 a.m. Intolerance was seen for paracetamol (n = 1), ibuprofen (n = 7) and opioid (n = 2).

CONCLUSION. Problems in analgesic use after outpatient surgery include undertreatment, poor compliance, overdosage, nightly breakthrough pain and poor tolerance due to side effects. Interventional studies should target these areas.

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Adequate treatment of post-operative pain is important to optimise patient mobility, appetite, sleep and recovery of function [1-4]. Outpatient surgery requires that patients self-manage their post-operative pain, as they are sent home few hours after surgery. Despite oral and written patient instructions and a high patient satisfaction, several studies have shown inadequate post-operative pain relief [5-8].

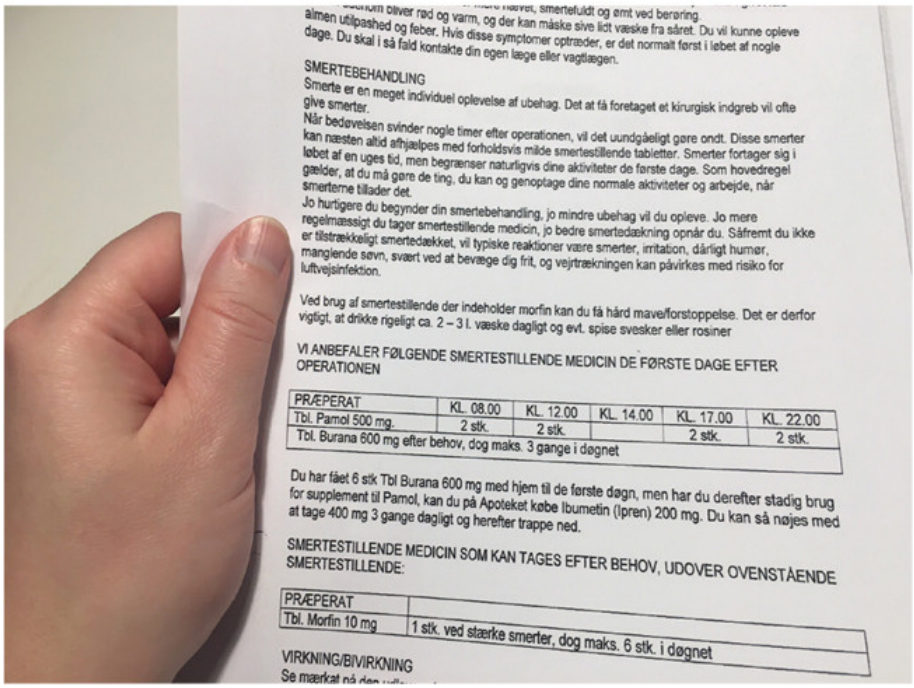
Causes of undertreatment of post-operative pain have been investigated previously [9, 10] and involve problems in the assessment and interpretation of pain, inappropriately prescribed treatment and insufficient patient education. Many factors such as individual care, training and reminders have been targeted to improve adherence to medication [11], but non-adherence to prescribed analgesics remains a challenge due to fear of becoming addicted, a general dislike of medication, misunderstanding and/or lack of information regarding

analgesics, etc. [12, 13]. Furthermore, good adherence alone will not achieve adequate analgesia if the prescribed analgesics are insufficient [14]. Studies into optimal pain treatment after outpatient surgery are many [15, 16], and although the outcomes have included analgesic consumption, few details have been reported. Knowledge of the actual medicine taking behaviour of adult surgical outpatients is limited regarding dosage, timing and co-administration, also as far as pain intensity is concerned. This study described how the medication taken relates to the prescribed medication and to pain intensity to improve recommendations of drug choice and scheduling. Also, we described which errors occur to improve patient education and compliance.

METHODS

The present study was a secondary analysis of a randomised, double-blind pharmaceutical trial conducted at the Day Surgery Centre at Horsens Regional Hospital, Denmark. Methods have been described in detail elsewhere [17]. Briefly, patients scheduled for arthroscopic shoulder surgery received 40 mg, 8 mg or 0 mg of dexamethasone intravenously before surgery. Patients were discharged directly from the post-anaesthesia care unit (PACU) after having received oral and written instructions regarding pain management (see **Figure 1**). Patients were recommended paracetamol (PCM) 1 g four times daily (8 a.m., 12 p.m., 5 p.m. and 10 p.m.), and as needed: ibuprofen 600 mg up to 1,800 mg daily, and morphine 10 mg up to 60 mg daily. In cases of known morphine intolerance, tramadol 50 mg as needed up to 400 mg daily was recommended. Envelopes with the medication were provided at discharge. Data were obtained from the medical records and a questionnaire about analgesia until the third post-operative day. Patients recorded pain intensity on a numerical rating scale (NRS): 0 = no pain and 10 = worst imaginable pain, at 8 a.m. and 8 p.m., including present, average and worst pain since previous assessment. For the day of surgery (day 0), the assessment period for average and worst pain was from discharge until 8 p.m. Analgesic use was reported continuously in the questionnaire with time, drug name and dose. Non-steroid anti-inflammatory drugs (NSAIDs) other than ibuprofen ingested in their recommended dose were converted to a 600 mg dose of ibuprofen. Other opioids were converted to oral morphine equivalents by multiplying the tramadol dose by 0.1 and the oxycodone dose by 1.5. If the mean NRS was < 3, analgesic treatment was deemed sufficient – low-pain group (LPG), as pain most probably did not interfere with mobilisation, appetite and sleep. A mean NRS from 3 and to 6 was left uninterpreted, but a mean NRS ≥ 6 was deemed insufficient – high-pain group (HPG).

FIGURE 1 Written patient information.
Burana is a brand name of ibuprofen.



almen utilpashed og feber. Hvis disse symptomer optræder, er det normalt først i løbet af nogle dage. Du skal i så fald kontakte din egen læge eller vagtlægen.

SMERTEBEHANDLING
Smerte er en meget individuel oplevelse af ubehag. Det at få foretaget et kirurgisk indgreb vil ofte give smerter.
Når bedøvelsen svinder nogle timer efter operationen, vil det uundgåeligt gøre ondt. Disse smerter kan næsten altid afhjælpes med forholdsvis milde smertestillende tabletter. Smerter fortager sig i løbet af en uges tid, men begrænser naturligvis dine aktiviteter de første dage. Som hovedregel gælder, at du må gøre de ting, du kan og genoptage dine normale aktiviteter og arbejde, når smerterne tillader det.
Jo hurtigere du begynder din smertebehandling, jo mindre ubehag vil du opleve. Jo mere regelmæssigt du tager smertestillende medicin, jo bedre smertedækning opnår du. Såfremt du ikke er tilstrækkeligt smertedækket, vil typiske reaktioner være smerter, irritation, dårligt humør, manglende søvn, svært ved at bevæge dig frit, og vejrtrækningen kan påvirkes med risiko for luftvejsinfektion.

Ved brug af smertestillende der indeholder morfin kan du få hård mave/forstoppelse. Det er derfor vigtigt, at drikke rigeligt ca. 2 – 3 l. væske dagligt og evt. spise svesker eller rosiner

VI ANBEFALER FØLGENDE SMERTESTILLENDE MEDICIN DE FØRSTE DAGE EFTER OPERATIONEN

PRÆPERAT	KL. 08.00	KL. 12.00	KL. 14.00	KL. 17.00	KL. 22.00
Tbl. Pamol 500 mg.	2 stk.	2 stk.		2 stk.	2 stk.
Tbl. Burana 600 mg efter behov, dog maks. 3 gange i døgnet					

Du har fået 6 stk Tbl Burana 600 mg med hjem til de første døgn, men har du derefter stadig brug for supplement til Pamol, kan du på Apoteket købe Ibumetin (Ipren) 200 mg. Du kan så nøjes med at tage 400 mg 3 gange dagligt og herefter trappe ned.

SMERTESTILLENDE MEDICIN SOM KAN TAGES EFTER BEHOV, UDOVER OVENSTÅENDE SMERTESTILLENDE:

PRÆPERAT	
Tbl. Morfin 10 mg	1 stk. ved stærke smerter, dog maks. 6 stk. i døgnet

VIRKNING/BIVIRKNING
Se mærkat på den

Statistic methods: Basic descriptive statistics (count, mean, percentage), student's t-test and Fisher's exact test were used as appropriate, in STATA version 17.0 (Statacorp, USA).

Trial registration: not relevant.

RESULTS

Data were obtained from 101 patients between November 2011 and April 2013, and 79 patients (78.2%) completed follow-up, including completed medicine diary and up to one missing NRS value. Four patients were excluded due to daily analgesics for non-shoulder pain, leaving 75 patients for analysis. The mean age was 53 years, Body Mass Index (BMI) 27 kg/m^2. Patients were American Society of Anesthesiologists (ASA) group I-II, and 55 of 75 patients were female. They were discharged directly to their home. Dropouts were identical with respect to age, BMI and ASA group, but with a male preponderance (55% versus 45%). Patients were discharged between 10:41 a.m. and 8:00 p.m. with a mean length of stay after surgery of 153 min. (range: 35-405 min.). Pain treatment was sufficient for 33 patients (44%) with an overall mean NRS < 3 and insufficient for 12 patients (16%) with a mean NRS ≥ 6 (**Figure 2**).

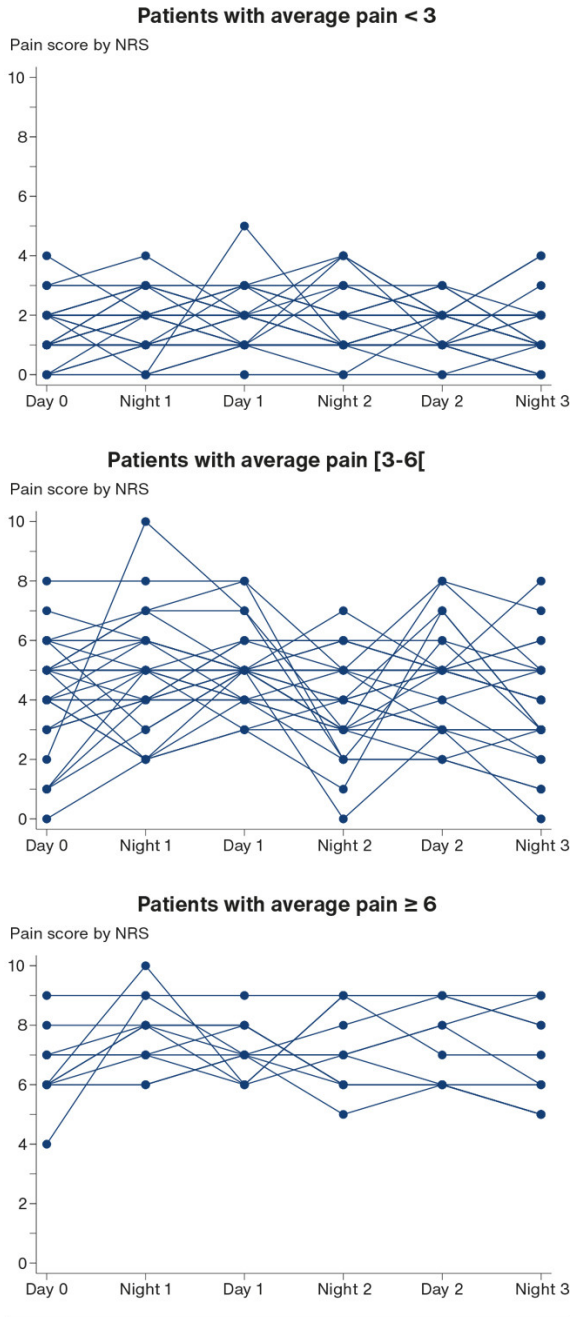
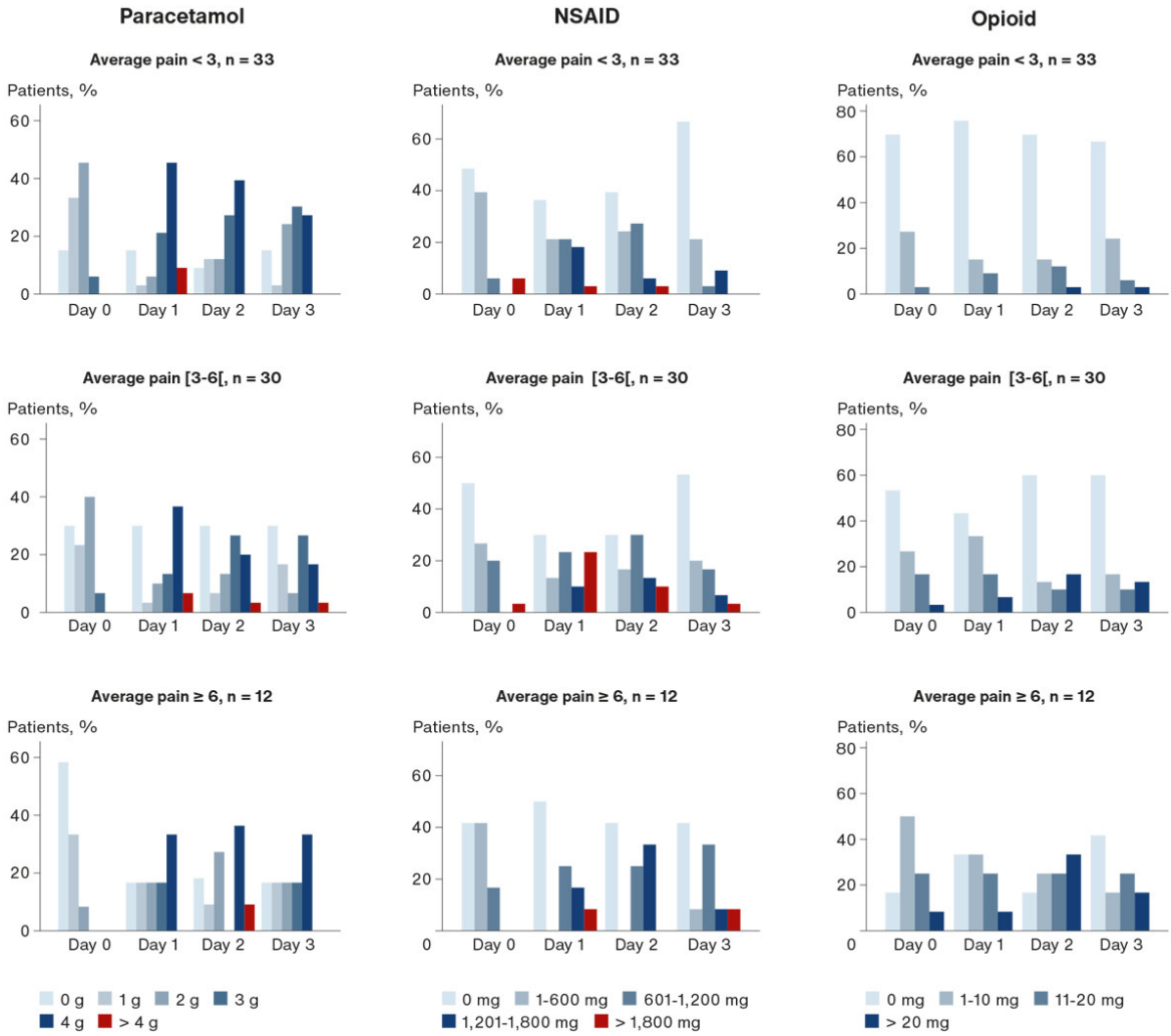


FIGURE 2 Average pain scores during the first three days and nights after surgery. Pain scores are by numerical rating scale (NRS) 0-10.

Pain ratings and daily analgesic consumption

PCM, NSAID and opioid intake are depicted in **Figure 3.** The LPG consumed more PCM after discharge than the HPG on day 0: mean 1,424 mg versus 500 mg, $p < 0.01$. Discharge times coincided: mean 3:10 p.m. (95% confidence interval (CI): 2:30-3:48 p.m.) for LPG versus mean 2:46 p.m. (95% CI: 1:36-3:56 p.m.) for HPG. For the 42 patients with mean NRS ≥ 3, compliance was poor as only 14 patients (33%) had a daily consumption of ≥ 3 doses on days one to three. Nine of the 75 patients did not take any PCM and only one of these patients was allergic. Above recommended daily doses were reached by 1 g five times daily (n = 6) or 1.5 g three times daily (n = 1).

FIGURE 3 Daily consumption of analgesics. Patients are grouped by average pain scores (numerical rating scale 0-10).



The LPG decreased consumption of NSAID over time, whereas the HPG increased consumption (day 3: mean 297 mg versus 750 mg, p = 0.03). Twenty-one of the 75 patients (28%) did not take any NSAID. In seven of these cases, this was explained in the medical files; six patients were allergic or intolerant to NSAIDs and in one patient it was contraindicated due to gastric ulcer. Among the remaining 14 patients (18.7%) not taking NSAID, six may not have needed it as their overall mean pain score was < 3. Oppositely, four patients (5.3%) described not tolerating NSAIDs well (stomach pain, rash, discomfort) but still ingested ibuprofen at least once. The recommended daily dose of NSAID was exceeded by 14 patients (18.7%); for three of these (4%), this occurred on more than one day (red in Figure 3). The errors leading to excessive and possibly harmful doses fell in three categories: 1) correct dose but too many times/day (n = 8, 10.7%), e.g. 600 mg ibuprofen four times; 2) too large a dose but ≤ 3 daily administrations (n = 7, 9.3%), e.g. two pills of ibuprofen 600 mg three times daily when used to ibuprofen 200 mg pills; and 3) correct maximal dose of each of two different brand names of NSAIDs, collectively exceeding the safe dosage (n = 1, 1.3%).

Opioid intake was increased in patients reporting more pain (mean 109 mg vs 33 mg, p < 0.01); however, since the mean NRS for 12 of the patients (16%) was ≥ 6, the consumption was interpreted as insufficient. During the

three-day period, 27 patients (36%) did not take any opioid after discharge and none of these had allergy or intolerance for opioids registered in their medical files. Among these 27 patients, 17 had an overall mean NRS < 3, indicating that opioid was not needed. One patient was known to develop a rash after morphine and only ingested tramadol, which was tolerated well. Another patient reported previously experiencing itching after "synthetic morphine" (expression mentioned in the patient's self-report) and was prescribed ordinary morphine, which caused severe vomiting, swelling and reddened skin on day one and two. The recommended daily dose of opioid was exceeded by one patient who prior to surgery took tramadol 200 mg twice daily and post-operatively supplemented this with 1-4 daily doses of morphine 10 mg. NRS were never < 5, so despite exceeding the recommended maximum daily opioid amount, the patient was undertreated.

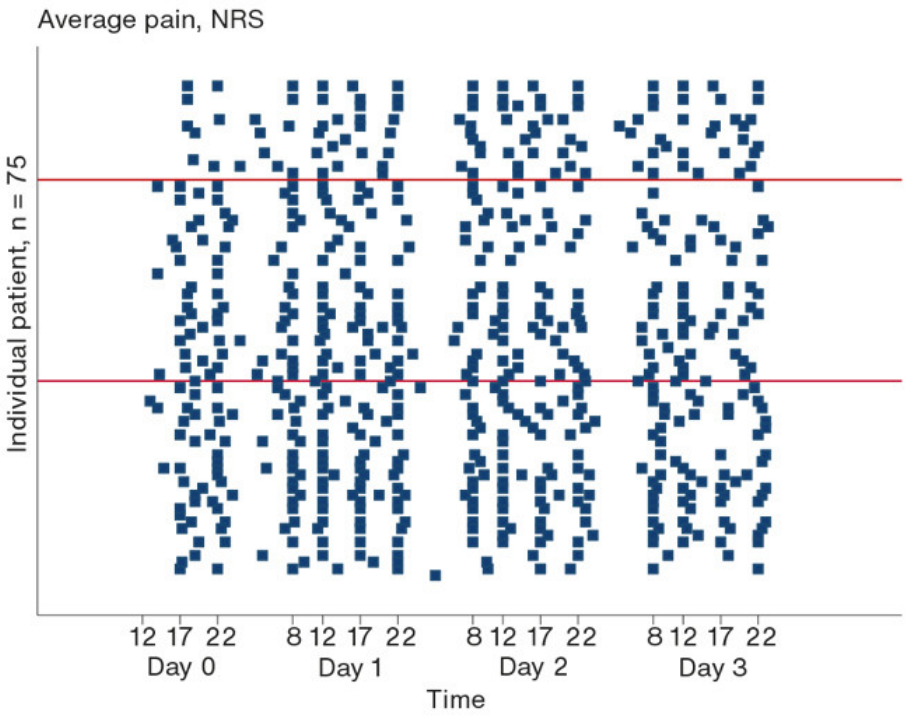
Combinations of analgesics

Although instructed in multimodal analgesia combining PCM, NSAID and opioid, some patients used other combinations. The expected combinations were used by 53 of 75 patients (70.7%): PCM, NSAID and opioid (n = 31, 17.3%), PCM and NSAID (n = 18, 24%), PCM alone (n = 3, 4%) and no medication (n = 1, 1.3%). Thirteen patients (17.3%) took PCM and opioid. NSAID alone was taken by three patients (4%), and NSAID and opioid were taken by five patients (6.7%). One patient only took opioid. The patients who did not take any PCM and were not allergic did take NSAID and/or opioid and most likely did not appreciate the rationale of using PCM to limit the use of NSAID and opioid and thereby their side-effects. Due to the sample size, a reasonable comparison of the efficiency of the different combinations was not achievable.

Timing of analgesic consumption

Figure 4 illustrates the timing of PCM doses. PCM was taken within one hour of the suggested times by 34 of the 75 patients (45%) on average. The number of compliant patients missing ≤ 3 doses within an hour of the recommended time was ten of 33 in the LPG (30%) and two of 12 in the HPG (17%). However, this did not reach significance by Fisher's exact test (p = 0.47), being underpowered. Administration times for ibuprofen often followed the times of PCM administration. The instructions did not mention a dosing interval but only limited the number of daily NSAID doses to three, and dosing intervals were as narrow as two hours.

FIGURE 4 Timing of paracetamol doses in individual patients (n = 75). Patients are in ascending order according to average pain intensity. The red lines mark average pain intensities of 3 and 6 on the numerical rating scale (NRS) 0-10.



Analgesic medication was taken nightly (12 a.m. to 6 a.m.), by 22 patients (29.3%) the first night. The second night, 11 patients (14.7%) registered doses, and the third night, 11 patients (14.7%) also registered doses. Some patients had more than one nightly dose, so the number of patients experiencing one or more nightly failures in pain coverage was 32 (43%). No pattern in timing or drug was found, suggesting that the dose was used for break-through pain. Four patients (5.3%) took tramadol and morphine at the same time points, and one patient (1.3%) took two different brand names of ibuprofen at the same time point. This patient exceeded the recommended single dose, but not the total daily dose as was the case for the other patient taking two brands of ibuprofen concurrently.

DISCUSSION

In the self-management of pain in these outpatients, errors in dosage and co-administration occurred. Confusion due to different brand names or strengths compared with patients' usual medication resulted in potentially unsafe doses of NSAID and PCM. As found in other studies, undertreatment was common as mean NRS were ≥ 6 in 12 patients (16%) [5, 7, 8]. These findings may guide future revisions of patient information. Findings to support revisions of the prescribed treatment are more challenging as adherence to the prescribed treatment was poor and patients demonstrated a very wide variation in analgesic use. An unexpectedly high frequency of nightly rescue doses was found, indicating that a longer-lasting analgesic may be preferable. The discrepancy between tolerating, consuming and needing NSAIDs and opioids (as indicated by NRS) is remarkable, as it seems that many patients had reasons for not taking the prescribed treatment that was not recorded in the medical files. This highlights the need to assess 1) whether the patient understands our recommended treatment and 2)

whether the patient agrees, or has experiences or beliefs leading to non-adherence, and to handle these issues.

Qualitative studies have found several causes of non-adherence to the prescribed regime, e.g., concerns about adverse effects, fear of addiction, advice from family and healthcare providers, a belief that tolerance of pain was desirable and a general dislike of taking medication [12, 18]. These causes may also apply to outpatients. Our study was not designed to assess causes but to describe the results of those considerations within patients, as well as possible misunderstandings regarding the medication and the extent of the problem of undertreatment. The literature on ambulatory medication errors reports many of the same problems [19]. Reports of patient safety have included problems of self-medication [20], but a specific focus on the safety of pain medication after outpatient surgery is scarce. However, based on our findings of excessive doses occurring in quite a few of the patients, this issue should be pursued further.

Some patients may prefer to be in pain rather than take medication, but beyond the unpleasantness, pain impacts sleep, appetite, mobility, exercises and may also prolong recovery due to complications such as deep vein thrombosis, pneumonia and muscle atrophy [1-4].

Some limitations of this study should be considered. First, one should be careful to generalise beyond the target population of the study as results may vary by patient group, demands on post-operative function (e.g., exercises) and intensity of post-operative pain. Our dropouts were more often male than female; and although we observed a trend towards lower pain scores and a lower analgesic intake for men, our study was not powered to make such analysis. As we sought problems in self-management, our findings are neither widely generalisable nor exhaustive, but they may serve to guide the preparation of patient information and similar inquiries in many settings. Second, a risk always exists of response bias when using a questionnaire although pleasing bias in the medication data is unlikely, seeing how poor adherence was documented.

Several interventions may be pursued based on the problems identified herein. Both the contents and the timing of the written and oral patient information should be considered. Many patients are not clear-headed 2.5 hours after surgery and oral information at that time is not efficient. Also, text messaging or telephone contact after discharge may improve pain coverage. Prescribing post-operative pain treatment should consider whether patients are challenged by intolerance that limits their treatment options. Furthermore, a more thorough pre-assessment may be effective, including patient beliefs and experiences concerning pain treatment and the rationale and goal of pain treatment.

CONCLUSION

Problems in analgesic use after outpatient surgery include undertreatment, poor compliance, overdosage of PCM and NSAIDs, nightly breakthrough pain and poor tolerance due to side effects. Interventional studies should target these areas to improve post-operative pain management.

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Conflicts of interest Potential conflicts of interest have been declared. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

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