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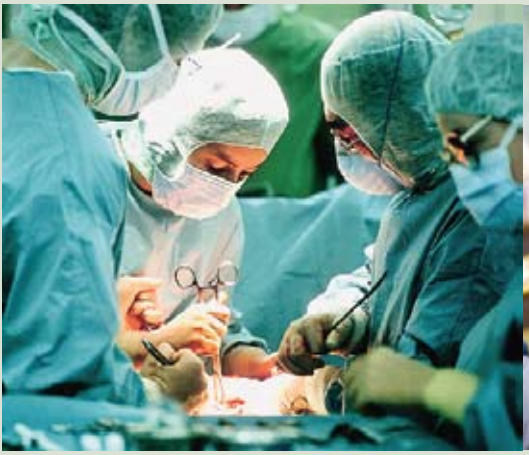


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Editorial

Claus Toftgaard

Ambulatory Surgery needs further improvements – again. Therefore the IAAS will try to make it even more like other web published journals and in accordance with the demands from PUB med and other indexes.

From 2010 the changes can be seen. However, the scientific level will still be the same high level as you may see in this edition. Improvements for both Journals and Association related work is an ongoing process. Therefore we are also working hard to make the next international congress in Copenhagen 2011 even more interesting than the former very well managed congresses. Please refer to the website **www.iaascongress2011.org** to keep you updated and go to the contact formula in order to get the most recent information.

Claus Toftgaard
President for the 9th International congress 2011
Associate editor

Postoperative Nausea and Vomiting after Inpatient and Outpatient Breast Surgery: Incidence and Effects of Midazolam

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Abstract

Aims: Determine the incidence and identify risk factors for postoperative nausea and vomiting (PONV) after inpatient and outpatient breast surgery.

Methods: Retrospective cohort study of 196 females undergoing mastectomy in Chapel Hill, North Carolina, USA. Anesthesia and PACU records were data sources. Data were analyzed using Chi Square, Fisher Exact Test and ANOVA.

Results: Incidence of severe PONV was 31.1% and was similar for inpatients and outpatients, Rates of PONV were higher for those who did not receive prophylactic antiemetic treatment (62.5%) than for those who did (29.8%), although this difference was not significant due to the small number of subjects who did not receive prophylactic antiemetics. Outpatients who experienced PONV also used greater amounts of opioids in the PACU. Rates of PONV were higher in outpatients not premedicated with midazolam.

Conclusions: 31.1% incidence of PONV after breast surgery. The anxiolytic midazolam may have beneficial antiemetic properties in ambulatory breast surgery patients.

Keywords: mastectomy, breast surgery, postoperative nausea and vomiting, PONV, midazolam, antiemetic.

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Introduction

Postoperative nausea and vomiting (PONV) occurs in 20–30% of surgical patients in the general population and in up to 70% of high risk patients within the first 24 hours after surgery [1–4].

This common anesthetic side-effect has been reported to increase patient dissatisfaction [5] and can be more distressing to patients than postoperative pain [6–7]. The strongest predictive factors for PONV are female sex, non-smoking status, a history of PONV or motion sickness and intraand postoperative use of opioids [4,8]. Of these factors, female gender is the greatest risk factor [6,9–11].

Notably, the breast surgery population, which is almost completely female, is at increased risk of PONV, with a reported incidence of up to 68% within the first 24 hours after surgery [9,12–15]. Because ambulatory breast surgery operations are becoming more common, severe PONV is potentially dangerous and costly, as PONV remains one of the few causes of unanticipated admission and patient dissatisfaction [5,7,16]. A few studies have suggested that the anxiolytic midazolam also is effective as a prophylactic treatment for PONV [17–21], but none of these studies focused on the high risk breast surgery population. The primary aim of this study was to determine the incidence of severe PONV in breast surgery patients, a high risk population, and to determine whether rates of PONV differ for inpatients versus outpatients, and for patients receiving different types of intraoperative prophylactic antiemetic therapy. A secondary aim was to examine potential risk or protective factors, particularly the use of midazolam premedication for anxiolysis. The PACU period was the focus of this study, in order to examine both inpatients and outpatients.

Methods

This study was approved by the University of North Carolina Institutional Review Board (05–2262). A retrospective observational cohort design was employed. Data were collected for 196 subjects receiving general anesthesia for breast surgery (57 partial mastectomy patients, 78 complete mastectomy patients and 61 complete mastectomy patients with immediate reconstruction) in a two year period. Subjects were drawn from an original simple random sample of 100 subjects from each surgical group who had breast surgery during the sampling period. Subjects who did not have complete medical records (N = 104) were excluded from the study, which reduced the total number of subjects to 196. Data on the same cohort's acute and persistent postoperative pain was reported previously [22]. The data sources were paper anesthesia records and Post Anesthesia Care Unit (PACU) records.

The primary variable was whether or not (yes or no) a subject experienced severe PONV in the PACU. The presence of PONV was determined by documentation of severe nausea or emesis by the PACU nurse and verified by the administration of rescue antiemetic treatment. A variety of risk or protective factors for PONV were examined, including demographic data (age, ASA status, history of smoking), surgical procedure (partial mastectomy, complete mastectomy, immediate reconstruction after complete mastectomy), inpatient/outpatient status, length of surgery (measured as total time under anesthesia care), intraoperative fluid intake (total ml), opioids (drug, dose and route) administered intra- and postoperatively, intraoperative prophylactic antiemetic treatment (drug(s), total dose) and premedication with the anxiolytic midazolam (yes or no, total dose).

The resulting dataset was nearly complete (<0.01% missing data points). Data were graphed using SigmaPlot (SPSS Inc., Chicago, IL)

and statistical analysis was performed using SPSS (version 15.0; SPSS Inc.). Data were expressed as counts (with corresponding percentage) or means (with standard error of the mean (SEM)). The cumulative incidence of PONV was calculated for the whole cohort and for stratified subsets. Characteristics of subjects with and without PONV were compared using Chi Square or Fisher's Exact Test for categorical variables and Analysis of Variance (ANOVA) for continuous variables, with α=0.05. Relative risks (odds ratios) and 95% Confidence Intervals (CI) also were calculated.

Results

The overall incidence of severe PONV in our breast surgery cohort was 31.1%. Breast surgeries were conducted on an outpatient basis for 77.2% of partial mastectomies, but only 1.3% of complete mastectomies and 4.9% of complete mastectomies with immediate reconstruction ($p<0.0005$). Rates of PONV were similar for inpatients and outpatients (30.4% vs. 33.3%; N.S.). Nearly all subjects (95.9%) received intraoperative prophylactic antiemetics. Rates of PONV were higher for those who did not receive prophylactic antiemetic treatment (62.5%) than for those who did (29.8%), although this difference was not significant due to the small number of subjects who did not receive prophylactic antiemetics. Three main types of prophylactic antiemetic therapy were used: ondansetron as a monotherapy (29.6% of total subjects); ondansetron with dexamethasone (33.2%); and ondansetron with dexamethasone and droperidol (24.5%). The mean $\pm$ SEM dose of prophylactic antiemetic was 4.05 $\pm$ 0.04 mg for ondansetron, 8.94 $\pm$ 0.20 mg for dexamethasone and 0.65 $\pm$ 0.02 mg for droperidol. Rates of PONV did not vary by type of prophylactic antiemetic therapy.

Characteristics of subjects with and without PONV were compared as a first step to identify potential risk or protective factors for PONV (Tables 1&2). Inpatients and outpatients were evaluated separately since their intraoperative and postoperative care varied greatly. Age, race, ASA status, smoking history, the use of nitrous oxide, fluid intake, length of surgery (measured as total time under anesthesia care) and intraoperative opioid use were not significantly different amongst subjects who did and did not experience PONV, for both inpatients and outpatients. However, for outpatients, subjects who experienced PONV were less likely to have received premedication with the anxiolytic midazolam ($p<0.05$; Figure 1). The same result was not found for inpatients (Figure 1). Outpatients who experienced PONV also used greater amounts of opioids in the PACU ($p<0.01$). PACU opioid use was similar for outpatients who did or did not receive midazolam premedication (12.26+1.00 versus 9.85+1.60, N.S.). When relative risks were calculated, outpatient subjects who did not receive midazolam premedication were found to have a 6.82-fold (95% CI: 1.15-40.41) increased risk of PONV relative to outpatient subjects who did receive midazolam premedication. The average dose of midazolam was 2.16 $\pm$ 0.06 mg.

Discussion

The emetic center is located in the lateral reticular formation of the medulla oblongata of the mid-brainstem in the central nervous system. Located at the level of the dorsal motor nucleus of the vagus nerve, it is proximal to the nucleus tractus solitarius and area postrema. The area postrema contains the chemoreceptor trigger zone (CTZ), a well vascularized area where the blood brain barrier is not as effective. Together, the CTZ, nucleus tractus solitarius and area postrema serve as sensors relaying impulses to the vomiting center. These impulses are controlled by the stimulation of multiple neuroreceptors including acetylcholine (muscarinic receptor), dopamine (D2 receptor), histamine, opioids and serotonin. Consequently, blockade of these receptors is the primary target of direct antiemetic medications [1,3,23–24]. In our cohort, nearly all subjects received prophylactic antiemetic therapy using the direct acting antiemetics ondansetron, a serotonin antagonist, alone or in combination with droperidol, a dopaminergic antagonist, or dexamethasone, a steroid and indirect acting antiemetic.

The incidence of PONV was 31.1% in our cohort. Age, race, history of smoking, ASA PS score, type or length of surgical procedure, intraoperative morphine equivalents, intraoperative nitrous oxide use and intraoperative intravenous fluid intake were not different among inpatient or outpatient subjects who did or did not experience PONV. Although tobacco abuse has been shown to significantly decrease the rate of PONV [4, 8], a decrease in PONV rates was not observed in our cohort among subjects with a history of tobacco abuse. The failure to find a difference likely relates to the fact that we were unable to distinguish retrospectively subject's with active tobacco use at the time of surgery from those subjects who had a history, recent or distant, of using but no longer actively using tobacco. There were relatively few smokers in either group.

Opioid use is a known risk factor for PONV [4, 8]. Inpatient and outpatient subjects with and without PONV received similar amounts of intraoperative opioids, expressed as morphine equivalents. However, postoperative opioid use was higher among outpatient (but not inpatient) subjects who experienced PONV. The fact that we did not observe an association between increased intraoperative opioid use and increased PONV likely relates to the fact that all subjects were similarly exposed to opioids intraoperatively, a high risk factor. The study population also was at high risk for PONV due to its composition as females undergoing a surgery associated with high rates of PONV [9,12–15]. Other studies have shown an increase in the incidence of PONV with an increase in the number of high risk factors [14], but this effect may be masked in a population as relatively homogenous as the one studied here.

The current study did not find a difference in rates of PONV among subjects receiving ondansetron monotherapy, ondansetron plus dexamethasone, or ondansetron plus dexamethasone plus droperidol. These results contrast with those of Apfel et al. [4], who conducted a multicenter, randomized, controlled, factorial trial to evaluate the effectiveness of ondansetron, dexamethasone and droperidol, alone and in combination. Their results demonstrated that ondansetron, droperidol and dexamethasone used as monotherapies reduced the incidence of PONV by 24-26% in high risk patients after general anesthesia. In addition, the incidence of PONV was further reduced by multimodal therapy from a 52% risk (no prophylaxis) to 37%, 28% and 22% with the use of one, two and three antiemetics, respectively, and it did not matter which combination of antiemetics were used. Our results are not in agreement with those of Apfel et al. [4]. This may be due to the retrospective design of our study and the limited postoperative time frame. A difference might have been observed if subjects were randomized subjects to treatment groups with standardized dosing and PONV also evaluated at later time points.

The present study showed that the incidence of PONV was higher when the anxiolytic midazolam was not used, but only among outpatients. Outpatient breast surgery patients who did not receive midazolam premedication were at a 7-fold increased risk of PONV compared to those who did receive midazolam. The effect of midazolam appears to be unrelated to the effect of postoperative opioids observed in outpatients, as subjects with and without midazolam premedication received similar amounts of opioids. Other studies have suggested that midazolam might be effective in PONV prevention without delayed emergence, prolonged PACU stays or

Table 1 Demographic, Clinical and Surgical Characteristics of Inpatient Breast Surgery Patients.

	Total (N=148)	No PONV (N=103)	PONV (N=45)	p value[2]
Type of Surgery				
Partial Mastectomy	13 (8.8%)	9 (8.7%)	4 (8.9%)	N.S.
Complete Mastectomy	77 (52.0%)	49 (47.6%)	28 (62.2%)	
Immediate Reconstruction after Complete Mastectomy	58 (39.2%)	45 (43.7%)	13 (28.9%)	
Demographic and Clinical Characteristics				
Age (mean + SEM years)	52.2±1.1	52.4±1.4	51.8±2.0	N.S.
Female	148 (100.0%)	103 (100.0%)	45 (100.0%)	N.S.
Non-Hispanic White Race	103 (69.6%)	70 (68.0%)	33 (75.0%)	N.S.
History of Smoking	33 (22.3%)	23 (22.3%)	10 (22.2%)	N.S.
ASA PS				
1	5 (3.4%)	3 (2.9%)	2 (4.4%)	N.S.
2	97 (65.5%)	71 (68.9%)	26 (57.8%)	
3	45 (30.4%)	28 (27.2%)	17 (37.8%)	
4	1 (0.7%)	1 (1.0%)	0 (0.0%)	
Prophylactic Antiemetics				
Ondansetron Monotherapy	36 (24.3%)	24 (26.7%)	12 (32.4%)	N.S.
Ondansetron + Dexamethasone	53 (35.8%)	40 (44.4%)	13 (35.1%)	
Ondansetron + Dexamethasone + Droperidol	38 (25.7%)	26 (28.9%)	12 (32.4%)	
Preoperative Data				
Midazolam Premedication	133 (90.0%)	94 (91.3%)	39 (86.7%)	N.S.
Intraoperative Data				
Nitrous Oxide	43 (29.1%)	32 (31.1%)	11 (24.4%)	N.S.
Fluid Intake (mean + SEM ml)	2919.6±143.7	3025.2±181.4	2677.8±224.7	N.S.
Total Time Under Anesthesia Care (mean + SEM min)	315.6±13.8	323.9±17.8	298.2±21.1	N.S.
Opioid Use				
Intraoperative Morphine Equivalents (mean±SEM mg)	39.1±2.2	39.9±2.7	37.4±3.8	N.S.
PACU Morphine Equivalents (mean±SEM mg)	13.8±1.1	14.3±1.5	12.6±1.3	N.S.

1 The table provides demographical information, clinical characteristics and surgical data for patients that underwent breast surgery between 1/1/2003 and 12/31/2005. For categorical variables, the table lists frequencies and percents. For continuous variables, the table lists means ± SEM.

2 Significance levels are derived from Chi Square or Fisher Exact Test for categorical variables or ANOVA for continuous variables. "N.S." means not significant.

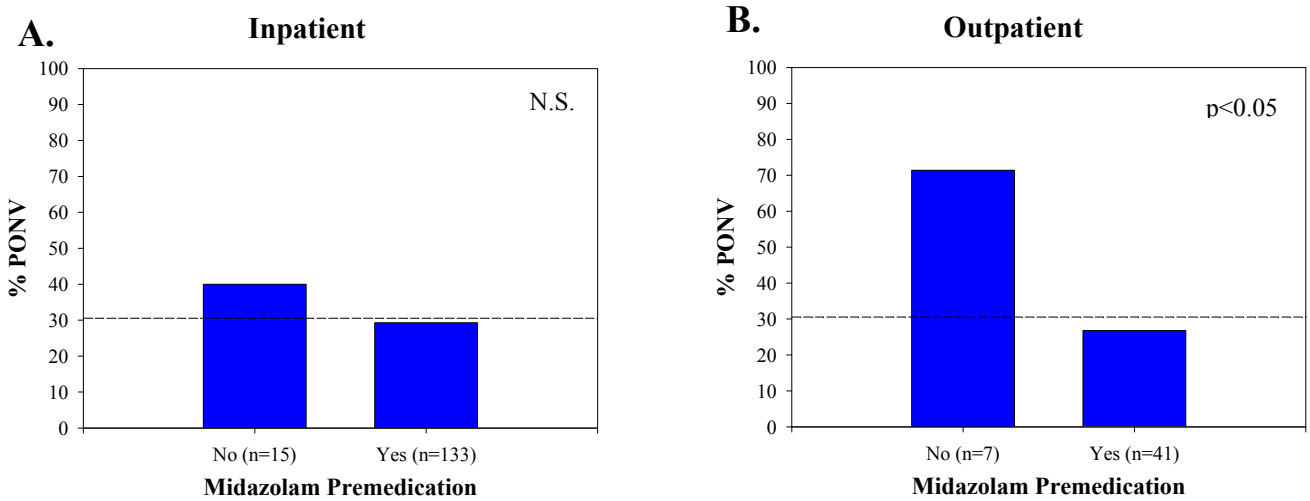

Figure 1 Rates of PONV with and without midazolam premedication for inpatients and outpatients.

The incidence of PONV is higher in subjects who did not receive midazolam premedication. The incidence of PONV for the cohort of breast surgery patients in the PACU (% ± 95% CI) is indicated on the yaxis. Whether subjects did or did not receive midazolam premedication is indicated on the x-axis. Data are shown for both inpatients (panel A) and outpatients (panel B). The dashed line marks the overall incidence of PONV in the entire cohort.

Table 2 Demographic, Clinical and Surgical Characteristics of Outpatient Breast Surgery Patients.

	Total (N=48)	No PONV (N=32)	PONV (N=16)	p value[2]
Type of Surgery				
Partial Mastectomy	44 (91.7%)	29 (90.6%)	15 (93.8%)	N.S.
Complete Mastectomy	1 (2.1%)	0 (0.0%)	1 (6.2%)	
Immediate Reconstruction after Complete Mastectomy	3 (6.3%)	3 (9.4%)	0 (0.0%)	
Demographic and Clinical Characteristics				
Age (mean + SEM years)	58.1±2.2	56.8±2.8	60.6±3.4	N.S.
Female	48 (100.0%)	32 (100.0%)	16 (100.0%)	N.S.
Non-Hispanic White Race	36 (75.0%)	27 (84.4%)	9 (56.2%)	N.S.
History of Smoking	7 (14.6%)	7 (21.9%)	0 (0.0%)	N.S.
ASA PS				
1	0 (0.0%)	0 (0.0%)	0 (0.0%)	N.S.
2	32 (66.7%)	24 (75.0%)	8 (50.0%)	
3	16 (33.3%)	8 (25.0%)	8 (50.0%)	
4	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Prophylactic Antiemetics				
Ondansetron Monotherapy	22 (45.8%)	15 (50.0%)	7 (50.0%)	N.S.
Ondansetron + Dexamethasone	12 (25.0%)	7 (23.3%)	5 (35.7%)	
Ondansetron + Dexamethasone + Droperidol	10 (20.8%)	8 (26.7%)	2 (14.3%)	
Preoperative Data				
Midazolam Premedication	41 (85.4%)	30 (93.8%)	11 (68.8%)	p<0.05
Intraoperative Data				
Nitrous Oxide	14 (29.2%)	9 (28.1%)	5 (31.2%)	N.S.
Fluid Intake (mean + SEM ml)	1449.0±154.3	1492.2±218.8	1362.5±158.0	N.S.
Total Time Under Anesthesia Care (mean + SEM min)	161.4±13.1	159.6±19.0	164.6±14.3	N.S.
Opioid Use				
Intraoperative Morphine Equivalents (mean±SEM mg)	20.1±1.5	19.7±1.8	21.0±3.0	N.S.
PACU Morphine Equivalents (mean±SEM mg)	6.6±0.91	4.9±0.9	9.9±1.9	p<0.01

1 The table provides demographical information, clinical characteristics and surgical data for patients that underwent breast surgery between 1/1/2003 and 12/31/2005. For categorical variables, the table lists frequencies and percents. For continuous variables, the table lists means ± SEM.

2 Significance levels are derived from Chi Square or Fisher's Exact Test for categorical variables or ANOVA for continuous variables. "N.S." means not significant.

adverse effects. In a study on 88 patients, preoperative midazolam (0.04 mg/kg) administration was shown to significantly decrease postoperative nausea compared with placebo in patients followed for 24 hours after intra-abdominal or peripheral outpatient surgery [18]. The prophylactic administration of midazolam has also been reported to reduce vomiting in children after tonsillectomy and strabismus surgery [17]. In another study on 88 adults undergoing cholecystectomy, both nausea and vomiting were significantly reduced and significantly fewer post-operative antiemetics were administered in the preoperative midazolam versus placebo group [19]. Jung et al. [20] administered midazolam after induction of anesthesia in 90 female patients undergoing general anesthesia for middle ear surgery and reported an incidence of PONV of 33.3% compared to an incidence of 60% with placebo. Lee et al. [21] found that midazolam was equally effective as ondansetron when administered 30 minutes prior to the end of urologic or gynecologic surgery. In our study, nearly all subjects received some prophylactic antiemetic treatment and the effect of midazolam was only observed when ondansetron alone was used prophylactically. In that case, the addition of midazolam premedication reduced rates of PONV to those observed with the combination therapies.

While the sedative-hypnotic effects of midazolam, a short-acting benzodiazepine, are well understood, the antiemetic properties continue to be investigated. It is hypothesized that dopamine input at the CTZ and adenosine re-uptake are inhibited by midazolam, resulting in an adenosine-mediated decrease in dopamine release, production and postsynaptic action in the CTZ [25]. Midazolam may also inhibit serotonin release and dopaminergic neuronal activity by binding to the gamma-aminobutyric acid (GABA) receptor [26]. Furthermore, the anxiolytic properties of midazolam have been suggested to contribute to its effects on PONV, apart from any direct antiemetic actions. However, anxiety has not been shown to reduce gastric pH, increase gastric volume or slow the rate of gastric emptying [27–8]. In addition, when other causes of PONV are taken into account, anxiety has only a weak association with PONV [29]. Although the mechanism of midazolam's antiemetic effects is unclear, our findings and those of others support midazolam's use as an effective part of prophylactic antiemetic therapy in some circumstances. Therefore, it is surprising that midazolam is not mentioned in the Society for Ambulatory Anesthesia's guidelines for the management of PONV [30].

Our study was limited by its retrospective nature and therefore our data are subject to both bias and confounding. Although the data were nearly complete, we cannot verify the accuracy of the data since all data were abstracted from medical records. PONV was assessed only in the PACU period and therefore the current findings may not generalize to later time periods. In addition, data were analyzed from a relatively small sample of subjects who did not receive midazolam, and a larger sample size and prospective design is required to validate our findings.

Conclusions

Approximately 60% of all operations in the United States annually occur in the ambulatory setting [31]. Surgery remains the primary treatment for over 213,000 women diagnosed annually with breast cancer, and most of these surgeries are conducted on an outpatient basis [32]. These women are at high risk for PONV as a result of their gender and surgical procedure, and PONV remains one of the few causes of unanticipated admission and patient dissatisfaction [5,7,16]. Our study examined the incidence of PONV in breast cancer patients receiving general anesthesia for mastectomy. Rates of PONV were similar among inpatient and outpatient subjects. Rates of PONV were higher among outpatient subjects who used greater amounts of opioids in the PACU and interestingly, who were not premedicated with midazolam. The anxiolytic midazolam may have beneficial antiemetic properties in ambulatory breast surgery patients.

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A survey of patients' personal expenditure related to ambulatory surgery

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Abstract

Aim: To examine the personal expenses for a patient admitted to hospital for a single ambulatory surgical procedure and to determine the factors related to the level of these expenses.

Methods: Patients (n = 145) treated in one ambulatory unit during a six-month period during 2004 were included in the study.

Results: Patients reported total personal costs from between 5 and 772. There was a difference between patients' expenses and the type of surgery and the patients' vocational education.

Conclusion: Effective interventions that reduce personal expenses are needed to make ambulatory surgery an economic treatment for individual patients.

Keywords: Health care costs; Patient's expenditure; Ambulatory surgical procedures.

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Introduction

In the last two decades there has been an increase in the proportion of the Gross Domestic product (GDP) spent on public healthcare services mainly in the Organisation of Economic and Co-operative Development (OECD) countries. This has increased from the OECD average of 7.3% in 1990 to an OECD average of 8.9% in 2007 [1].

An increase in ambulatory surgery, rather than standard surgery, has reduced the costs of the public healthcare service [2]. Nowadays, the USA, Canada and Scandinavian countries have the highest rate of ambulatory surgery. Elective surgery is performed as an ambulatory procedure in 55% of cases in Denmark, 50% in Sweden, 48% in Norway and 37% in Finland. The proportion of ambulatory surgery is over 80% in the USA and Canada. [3]

Ambulatory surgery has been shown to be an economic and effective way to provide public health services. The savings using ambulatory surgery have been demonstrated in many areas of surgery for example laparoscopic cholecystectomy [4, 5] antireflux surgery, adrenalectomy and splenectomy [5], and arthroscopy [6]. However, these economic advantages have only been shown at a health organization and societal level.

In a publicly financed healthcare system patients need to pay only a small part of the ambulatory surgery costs. Some of these costs are standard whilst others are priced on an individual basis. This study focuses on ambulatory surgical patients' personal costs, which have not been reported in earlier studies.

The aim of this study is to describe the personal expenses for a patient admitted to hospital for a single ambulatory surgical procedure and to determine the factors related to the level of these expenses. The goal is to find out how the personal expenses varied depending on the demographic characteristics of the patient.

Research questions:

1. What personal expenses do ambulatory surgical patients pay?

2. What factors are related to the level of these expenses?

Methods

Design

A questionnaire survey was conducted over a six-month period during 2004 to analyse the personal costs of ambulatory surgical patients.

Sample

The sample consisted of ambulatory surgical patients treated in an ambulatory surgical unit in a university hospital in Finland. This study included all ambulatory surgical patients admitted to hospital between March and August. Patients were included if they were 18 years old or over, Finnish speaking, able to complete a questionnaire by themselves and without diagnosed cognitive disorders. 200 patients fulfilled these criteria and 50 patients refused to participate in the study. Five patients were excluded because of the unavailability of questionnaires, and so a total of 145 patients were included in the study. The total response rate was 73%. Approximately 2900 adult patients are admitted annually into this unit [7].

Hospital charges

A standard Finnish hospital charge for an ambulatory surgical operation was €72 (current fee €83.90) per patient during data collection. Usually, before an ambulatory surgical operation, the patient is required to visit an outpatient clinic, for which the personal charge was a maximum of €22 (current fee €25.60). Post-operatively the patients may receive a surgeon's prescription for medical rehabilitation at a health centre or hospital. These rehabilitation services cost the patient up to €6 (current fee €7) per visit [8]. Pre-

and post-operative pharmaceutical costs are also borne by the patient but this is mitigated by sickness insurance that reduces the cost of prescription medicines to 42% of the medication price [9].

Data collection methods

Data were collected using a structured questionnaire formulated for this study. The questionnaire was based on the literature and the views of a clinical and scientific expert panel. The questionnaire was divided into seven areas of individual patient expenses a) hospital charge, b) bandaging material, c) rehabilitation equipment, d) medication, e) travel between home and hospital, and f) help from a significant other on the operation day and during rehabilitation post-operatively. The participants were also able to add any other relevant expenses with an explanation of their origin to the completed questionnaire. The patients' demographic variables requested consisted of gender, age, level of basic education, level of vocational education, and type of surgical operation. The questionnaires were distributed to the patients before being discharged home. The participants were asked to return the questionnaires two weeks after discharge by post. This was thought to be an appropriate time allowing for clinical recovery so that the research participants would know all their pre- and post-operative expenses.

Ethical considerations

This study was approved by the University Hospital Committee for Medical Investigation. Patients gave their informed consent to become a volunteer research participant.

Data analysis

The statistical software package SAS Release 8.02 was used to analyse the data. The demographic variables and personal expenses were analysed using descriptive statistics. The personal expenses variables were organized into five sum variables: total personal costs, hospital charge, equipment costs (treatment and rehabilitation), medication and other costs. Patients' personal expenses results were categorized into either three groups using 25 and 75 percentiles or two groups using 50 percentile according to the distribution of the expenses.

Differences between demographic variables and personal expenses were determined using the ANOVA one-way analysis. Percentiles and the Chi-square test were used to describe personal expenses and for determining the relationships between the level of personal expenditure and the demographic variables. In all tests, $p<0.05$ was considered statistically significant.

Table 1. Demographic variables (n = 145).

Variable	n = 145	%
Gender		
Male	68	47
Female	77	53
Age, years		
19 – 34	30	20
35 – 50	50	35
51 – 65	50	35
66 – 83	15	10
Basic education		
Elementary school	40	28
Comprehensive school	63	44
Matricular examination	39	28
Vocational education		
Secondary level	58	43
Post-secondary level	34	25
Academic level	18	13
No vocational education	25	19
Surgical procedure		
Shoulder	26	18
Knee	30	21
Other orthopaedic	64	44
Other ambulatory	25	17

Results

Sample characteristics

Over half of the participants were female (53%, Table 1). The mean age of patients was 48 years (range 19–83). The largest group of patients had completed basic education at the comprehensive school level (44%). The largest group within those who had completed vocational education were at the secondary level (43%). About two fifths of the patients required either knee (21%) or shoulder (18%) arthroscopy. The rest of the patients required other orthopaedic operations (44%). These included hardware removal, various hand operations or other ambulatory operations such as urological or plastic surgery (17%). Most of the patients (n=87, 80%) took sick leave after their operation. The average duration of sick leave taken was 35.4 days (range 1–94).

Ambulatory surgical patients' personal expenses

Almost all patients (n=128, 88%) reported personal expenses relating to their ambulatory surgery (Table 2). The total expenses ranged from €5 to €772 (M=182.4,SD=45.8). In addition, very low costs were incurred by individuals for home aid, a home nurse, car parking during the hospital stay and rehabilitation after discharge. None of the research participants incurred rehabilitation equipment costs.

Using the 25 and 75 percentiles of the expenses the total patient expenditure was grouped into three levels: low (under €100), medium (€100–199) and high (€200 or over). Almost half of the patients' expenditure (n=58/127, 46%) fell into the medium level and about one third (n=38/127, 30%) fell into the low level. The remaining quarter (n=31/127, 24%) was in the high level group.

The patients who spent money on the hospital charge, bandaging material, medication and other costs were divided into two groups

Table 2 Ambulatory surgical patients' personal costs in Euros.

Personal costs	n	M	SD	range
Total costs	128	182,4	45,8	5–772
Hospital charge	121	114,5	104,5	0–542
Cost for medication	93	35,3	37,4	0–270
Travel	93	25,6	26,2	0–156
Bandaging material	48	9,1	14,4	0–72
Help for significant other	35	4,9	14,4	0–50
Investigation costs	9	82,2	107	6–350
Costs for a medical certificate	7	12,3	7,9	6–28

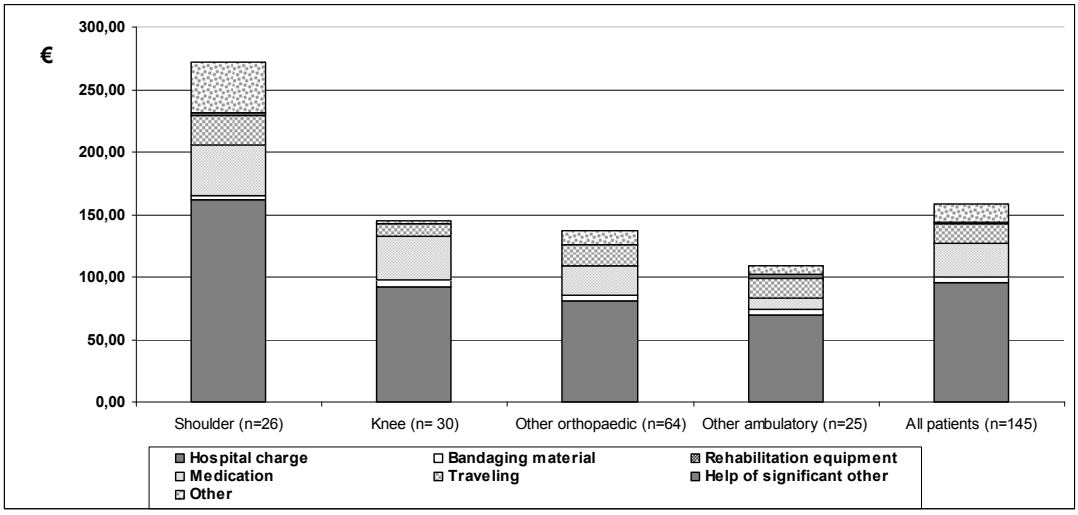

Figure 1 Day surgery patient's personal costs according to operation speciality.

using 50 percentile reflecting low and high levels of expenditure. The low and high level of the hospital charge ranged from €0-99 and €100 and over respectively. Most of the patients had a hospital charge at the low level (n=99/127, 78%). Bandaging material costs were grouped at the low level under €10 and the high level €10 and over. Again most of the costs were incurred at the lower level (n=97/127, 76%). The two groups for medication costs were under €50 and €50 and over. These were also largely incurred at the lower level (n=102/127, 80%). Lastly, most of the patients (n=102/127, 80%) had spent under €50 on other costs.

Factors related to the level of expenditure

By using the ANOVA one-way analysis the reported patient expenditure and the demographic variables were found to be related to the type of surgical operation and the patients' vocational education. Orthopaedic patients spent more money on their medication (M=30.0, SD=37.9, min. 0, max. 270.0) than patients requiring other surgical operations (M=8.7, SD=12.9, min. 0, max. 60.0, p=0.006). Patients with a vocational education at the secondary level spent the most on bandaging material (M=6.1, SD=12.1, min. 0, max. 72.0) whilst patients with no professional education spent the least (M=0.9, SD=3.1, min. 0, max. 15.0, p=0.006). However, these costs were so low, that they had a minimal impact on the total costs.

The difference between the level of spending and the type of the surgical procedure was examined in more detail. There were associations between the total expenditure, hospital charge and medication costs with the type of surgical procedure. Patients requiring a shoulder procedure had the highest total expenses (M=272.4, SD=200.9, min. 0, max. 680.0, p<0.0001, Fig. 1), hospital charges (M=162.3, SD=158.5, min. 0, max. 542.0, p=0.003) and medication costs (M=40.7, SD=34.1, min. 0, max. 126.5, p<0.005). The patients requiring non-orthopaedic procedures had the lowest total costs (M=108.8. SD=66.8, min. 0, max. 320.0), hospital charges (M=69.2, SD=47.0, min. 0, max. 250.0) and medication costs (M=8.7, SD=12.9, min. 0, max. 60.0).

Relationships between the factors that increased patient expenditure, at the total and specific level, and the patients' demographic variables were computed searching for factors that increased the expenditure. About half the orthopaedic patients (n=49/104, 47%) had a medium sized total expenditure for their surgical operation. 25% of the orthopaedic patients (n=26/104), spent under €100 (low) for their surgical operation and 28% had paid €200 or over (high, n=29/104). About half of the other surgical patients (n=12/23, 52%) had a low total personal expenditure and 39% (n=9/23) a medium personal expenditure. 9% of non-orthopaedic patients (n=2/23) had spent €200 or over. The relationship between total costs and type of surgery operation was statistically significant (Chi-square test, p=0.021).

Secondly, the detailed evaluation of the relationship between the personal patient expenditure and their demographic variables revealed that the type of surgical operation and the level of basic and vocational education were significantly related to the level of expenditure.

The hospital charge was considered by dividing the participants into two groups viz: those who spent up to €100 and those who spent €100 or over. Patients who had required an orthopaedic surgical operation had a high hospital charge (n=27/104, 26%, p=0.024). One fourth of the orthopaedic patients (n=24/104, 23%) had spent €50 or over on medication compared to all other patients who, for the most part, spent under €50 on their medication (n=22/23, 96%, p=0.041).

Discussion

There is no previous research considering the personal costs of ambulatory surgical patients in a publicly financed healthcare system making this work an important addition to the literature. The requirement for orthopaedic ambulatory surgery was the main factor affecting patient expenditure. Patients requiring orthopaedic surgery had the highest costs for medication compared with patients requiring other operations. This may be due to the difference in pain intensity after the operation linked to the postoperative use of analgesics. Orthopaedic operations of the extremities, as a group, have been reported to be the most painful operations [10]. The patients that required a shoulder procedure had the highest expenses. This may be due to the number of postoperative visits to hospital or public/private health care centres during the recovery phase. In earlier studies it has been shown that pain is one of the main reasons for postoperative visits to hospital after ambulatory surgery [11,12].

At present when a patient is in pain post-operatively they usually have to contact the centre where their treatment took place. The number of these post-operative contacts, resulting in the prescription of medication and associated costs, may be reduced with appropriate and empowering patient education in pre-admission clinics, day surgical units and during the discharge phases of the healthcare episode. Also some patients might manage more of their recovery at home without the aid of healthcare staff if this were done. Patients did not spend

money on rehabilitation equipment. This is because patients may use equipment, for example forearm crutch or collar cuff, on free loan from the Assistive Device Services organised by Finnish health centres [13]. Expenditure on bandaging materials was low which may be due to a low wound infection rate.

The results indicate that patients pay more for their ambulatory surgery than the standard costs enshrined in law. The way patients pay more for their ambulatory surgery differs amongst individuals for example the expenses reported by patients vary according to the different ways they are subsidised. One important way treatment and care is subsidised for some patients is the use of private sickness insurance.

Our most important finding was that ambulatory surgical patients in the government financed healthcare system spent an average almost €200, around €100 above the standard costs. The hospital charge was the highest single cost, which included a fee for all healthcare services, from the pre-operative phase to two weeks post-operatively. This charge is variable depending on the services used for example the hospital charge increases with the number of post-operative visits to private facilities. Overall the cumulative personal expenditure for individuals was found to be quite high. About 25% of the patients had a total expenditure of €200 or over, (high level) and almost 50% of the patients had a total expenditure of €100–€199 (medium level).

Limitations of the study

This study has limitations in the sample and the instrument. Our sample included patients from only one university hospital. Even though publicly financed healthcare services in other OECD countries have a similar payment structure for ambulatory surgical costs, the results should be generalized with caution.

Future research should focus on a more detailed level analysis of individual patients' personal expenses. The patients need exact instructions about how to calculate their personal expenses, for example to define the nature of hospital charges. Also questions that would help to capture the relationship between private sickness insurance and personal patient expenditure need to be added to the questionnaire.

Although it is known that ambulatory surgery has cost benefits to society it is important to take account of personal patient expenditure when the total costs of ambulatory surgery are considered. Ways of decreasing the financial burden on the patient must also be considered wherever possible.

Conclusion

The total costs of ambulatory surgery from a personal and a societal perspective should be examined in order to find out the real economic advantages of ambulatory surgery. Interventions, such as patient education, that reduce patients' expenses making ambulatory surgery a more economic choice from the perspective of individual patients as well as society also need to be carried out. It may be that ambulatory surgery is cheaper for society because some costs are transferred to the individual patients.

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Cataract extraction with lens insertion performance measurement study

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Abstract

Aim: To examine performance in ambulatory cataract surgery.

Methods: Participating organizations provided organizational, process, and follow-up patient data via surveys over a four month period.

Results: Median pre-procedure time (patient check in to incision) was 82 minutes. Median postprocedure time (dressing on to meeting discharge criteria) was 23 minutes. Forty-five cases (2.6%) were reported as having complications (28) or not routine (17). In 99% of cases, povidone iodine was used in the eye. Almost 2% of patients indicated they had unscheduled follow up and possible symptoms of infection.

Conclusion: Opportunities for improvement include decreasing: variation in procedure times; complicated/non-routine cases; and, possible post-operative infections.

Keywords: Cataract extraction, Ambulatory surgery center, Procedure time, Complications, Non-routine cases, Unscheduled follow up, Infection, Patient outcomes.

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Introduction

The purpose of the study was to provide opportunities to initiate clinical performance measurement on key processes and outcomes for cataract extraction with lens insertion in the ambulatory care setting. Cataract accounts for approximately one half of adult (over age 40) low vision cases. [1] In 2006, of the approximately 4.4 million cataract surgeries performed in the ambulatory setting, more than three fourths (approximately 3.25 million) of these were performed in freestanding facilities. [2]

Among the issues studied was "procedure times." Procedure times are indicative of not just efficiency but also safety and patient satisfaction. The pre-procedure or "wait" time can be associated with patient satisfaction. The post-procedure or "discharge time" (the patient meets discharge criteria – *not* when the patient's ride arrived) may signify over-medication during the procedure.

Complication rates were also studied. Complication rates for cataract surgery are not high (e.g., endophthalmitis: 0.74%; capsular rupture: 1.8%), but possibly preventable complications should be examined. The American Academy of Ophthalmology (AAO) recommends the use of a 5% solution of povidone iodine in the conjunctival cul de sac to prevent infection. When there is unscheduled follow-up associated with pain, inflammation, and/or redness at or near the operative site, it can be indicative of a post-operative infection or endophthalmitis.

Methods

Participant Recruitment

The AAAHC Institute for Quality Improvement solicited, via mail, participation from the Accreditation Association for Ambulatory Health Care (AAAHC) accredited organizations and those who had participated in previous AAAHC Institute cataract studies, as well as the wider population through the AAAHC Institute website (www.aaahciqi.org). Seventy-eight organizations voluntarily registered for the study. Seventy-one (representing more than 130,957 cataract procedures annually) submitted data. Annual cataract extraction procedure volume ranged from 70 to 8,000. Almost two thirds (65%) of the participating organizations were single specialty ambulatory surgery centers; the rest were multi-specialty specialty ambulatory surgery centers.

Case Data Collection

Data were collected using standardized survey instruments from August through November, 2007. All cases were collected during the same four-month period to avoid issues with "historical" factors such as changing prices and technology. Participating organizations completed a "General Information" survey, describing their organization and its practices, as well as "Procedure Specific" surveys, which included documentation of patient attributes (ASA classification [5] and indications for the procedure), specific processes of care and patient outcomes, via a telephone follow-up survey with patients 2 weeks post- surgery. Organizations were asked to complete surveys for 15 to 25 cases.

It should be noted that that 25 to 35 cases for the same procedure/diagnosis may be needed provide a statistically accurate picture of a physician's practice regarding that procedure/diagnosis. This assumes organizations' patients are statistically independent, which is unlikely [4], so even larger samples would be necessary for statistical accuracy. Instead, organizations participating in AAAHC Institute studies are asked to review their performance from year to year to develop a composite of their performance.

Cases matching the procedure code were assigned by a manager, so that the organization submitted a sample of procedures to form a composite profile of the practice. If organizations had more than one surgeon, they were encouraged to use data from two or more of their

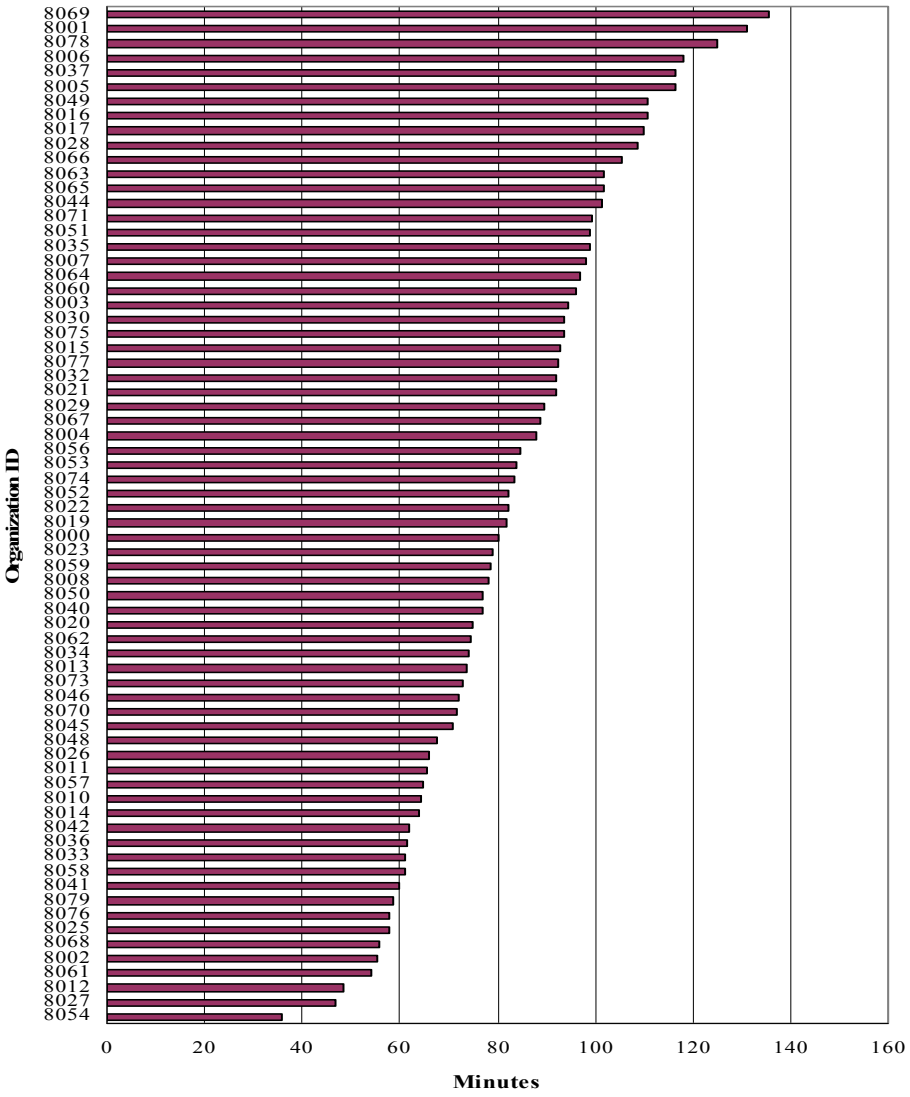

Figure 1 Average Pre-Procedure Time by Organization.

surgeons. To avoid retrospective chart reviews, and obtain the most complete and accurate data, all documentation of processes of care were completed concurrently (real time).

Data Review

A total of 1756 cataract extraction with lens insertion surveys were received and reviewed for accuracy and completeness. Each survey tool was reviewed in detail to ensure that the responses accurately represented a potential profile for the procedure identified. Surveys that appeared to include inconsistent data or outliers, or that had a small number of missing values, were checked with participating organizations to maximize completeness and consistency. The 45 complicated or non-routine cases that were submitted were not included in analyses because they might skew results; however, they are described in the Results section below. A total of 1711 surveys were used for aggregate (grouped) analyses. For the benchmark (comparison) of the procedure time analyses, (for which a minimum of 15 cases per organizations was required) 1701 cases from 70 organizations were analyzed.

Results

The results described here are part of a more extensive 2007 study report on cataract extraction with lens insertion. [5]

Patient Attributes

ASA classifications were assigned for 92% (1577/1711) of the cases; 94% of patients were classified ASA 2 or 3. [6] Indications for the procedure were documented for all cases—many had multiple indications. The most frequently listed indication for the procedure was "impaired visual function" (61%). For 99% (1001/1012) of those with visual acuity listed as an indication, acuity ranged from 20/20 to 20/800+, with a median of 20/60. Additionallly, "glare" was listed as an indication for the procedure in 47% of cases (808/1711).

Pre-Procedure Time

Pre-procedure time was defined as the time from the patient's checking in to the facility to the time the procedure began (the incision was made).

- The median pre-procedure time overall was 82 minutes; the times ranged from 36 to 135 minutes. See Figure 1.
- The time between when the patient has arrived at the operating room (OR) and when the procedure starts is included in the "pre-procedure" time because some organizations may be shifting the wait time from the patient waiting area to the procedure room itself. If the wait in the waiting area is short, but the wait in the OR is long, patient satisfaction may suffer and facility times (and associated cost to the organization) will remain higher.
- Pre-procedure time may be influenced by how early or late patients arrive. Patients who arrive very early may contribute to a longer average pre-procedure time, and those who arrive very close to the procedure time or who are "moved up" in the schedule because of a cancellation, may decrease the average pre-procedure time.
- In the 2003 AAAHC Institute study of cataract extraction with

lens insertion (the only year this correlation was studied), there was a correlation of 0.48 between how early patients arrived and pre-procedure time. This value indicates more than a chance relationship between average number of minutes early and average pre-procedure times. [7]

- Organization 8054 had the lowest pre-procedure time (See Figure 1.) They attributed it to:
  - Pre-operative screening before the day of surgery to anticipate any medical or ophthalmic problems, including:
    - reviewing charts and reporting special needs to the nursing director;
    - using a medical checklist, identifying special surgical equipment necessary, as well as the need for viscoelastics or solutions like Trypan blue, and making sur these are in or directly outside of the OR; and,
    - checking the powers and styles of intra-ocular lenses (IOLs) prior to surgery.
  - Adequate staffing for efficient patient flow for 2 ORs, consisting of:
    - a receptionist who obtains any consents that need to be signed, and administers dilating drops immediately upon arrival (if the patient hasn't been instructed to administer these at home);
    - 2 circulators (one in each OR);
    - 2 scrub personnel (one in each OR);
    - an instrument tech (goes between rooms);
    - 4 nurses (2 for pre-op prep and holding and 2 for post-op check out); and,
    - a floating nurse supervisor who fills in where needed and handles patient problems.
  - Scheduling patients, with more complicated cases at the end of the day.
  - Assigning patients specific arrival instead of surgery times
    - The nursing director sets the schedule 3–5 days prior to surgery;
    - The pre-op nurse calls the patient 2–3 days before the procedure;
    - This process allows for time to re-organize the schedule if cases are added.
  - Giving each patient printed post-operative instructions, including pictures of the postoperative drops used in a patient post-operative kit.
- Organization 8027 attributed pre-procedure performance to:
  - Scheduling longer cases at the end of the day;
  - Staffing up" (adding) pre- and post-op nursing staff;
  - Having the Circulator/Float set up phaco, so there is less physician wait time;
  - Using pre-printed paperwork; and,
  - Using topical and local anesthesia with intravenous sedation for 95% of procedures
- For Organization 8012, pre-procedure speed is explained by the following:
  - The ASC and Clinic are in the same building. This permits pre-operative patient interviews to understand patient needs and provide education, a tour of facility, and meeting the staff before the surgery.
  - Prior to patient arrival, the pre-operative area is set-up to anticipate any special needs (such as lifting or retrobulbar block) that each patient may require.
  - Eye drops are started upon arrival.
  - Patients remain in clean street clothing.
  - Patients' stretchers have attached limb leads for cardiac monitoring through the perioperative period.
  - IV saline locks with IV anesthesia permit patient anxiolysis prior to arrival in the OR.

Discharge Time

Discharge time is defined as the time from when the procedure finishes (and the dressing is on) to the time the patient meets discharge criteria.

- The overall median discharge time was 23 minutes, with a range of 3 to 41 minutes. (See Figure 2.)
- Please note that the definition of discharge time used for this study is from the time the procedure finishes to the time the patient is *ready for discharge* – not to the time the patient's ride has arrived.
- In addition to contributing to overall facility time (and the associated cost to the organization), longer discharge times may be indicative of inappropriate choice or levels of anesthesia for the patient, discharge criteria that are too strict, or staff not checking patients against discharge criteria frequently enough.
- Discharge times may also be longer if discharge instructions are being reviewed with patients/family for the first time or have not been provided in written form.
- Organization 8022, with the lowest discharge time of three minutes, attributed its performance to:
  - Using primarily topical anesthesia with a light IV sedation (thereby speeding up recovery);
  - Certified registered nurse anesthetists (CRNAs) in the OR keeping patients stabilized throughout the procedure and escorting them to recovery (rather than RNs) ;
  - Using mobile gurneys for quick transfers;
  - Prior to surgery, providing patients with packets to help them to understand what the discharge instructions will be;
  - Including patients' families in the discharge phase to assure that everything is understood (4 ears are better than 2!);
  - Employing a patient family assistant to narrate the surgery to the patient's family and ensure that the family is waiting in recovery for the patient and that all belongings are returned to the patient prior to discharge;
  - Offering patients only a small amount of water and juice before discharge; (not snacks that can take up time and make a mess); and,
  - Being aware that there is a fine line between being efficient and having patients feel like they are "cattle" being driven through the center.
- Organization 8027 described short average discharge time as being due to:
  - "Staffing up" (adding staff) at discharge;

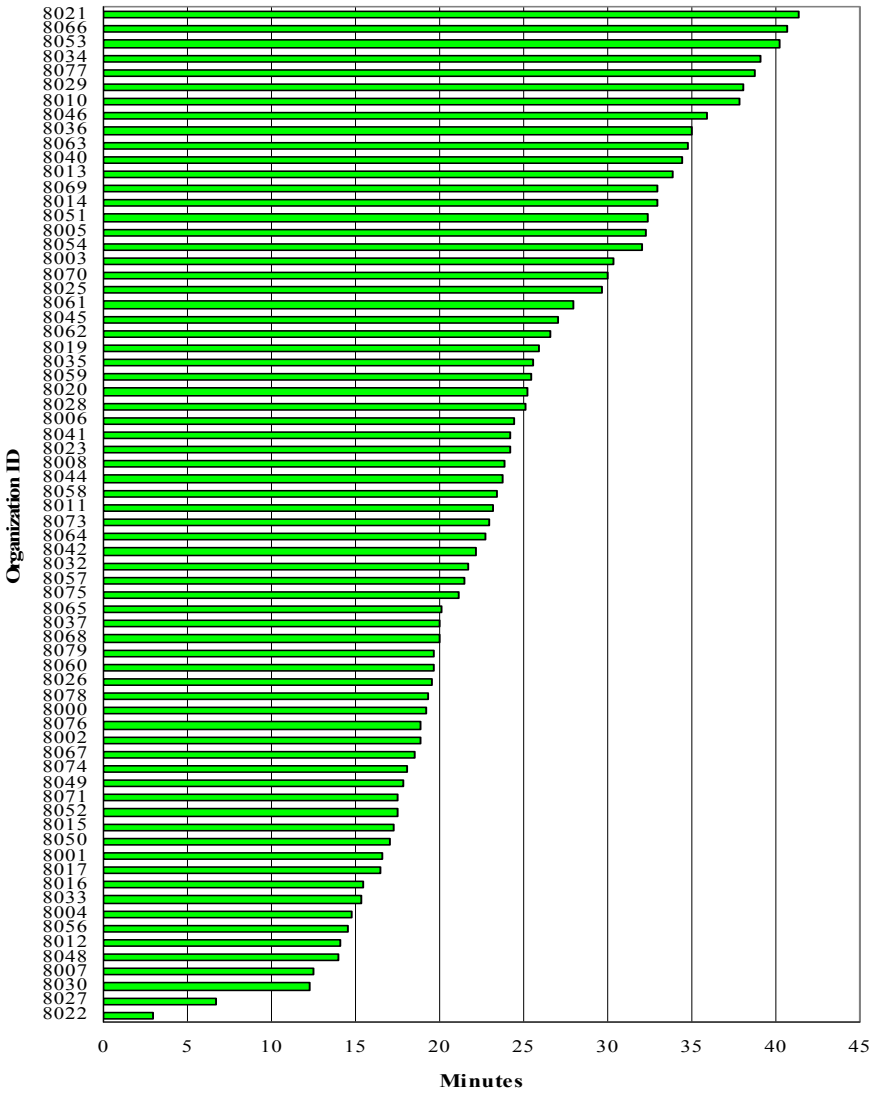

Figure 2 Average Discharge Time by Organization.

- using pre-printed paperwork;
- Using topical and mild sedation;
- Providing education during the pre-op phase; and,
- Having someone dedicated to escorting patients to the car.

• Organization 8030 has the third shortest average discharge time. Their efficiencies were noted as follows:

  • Use a system where nurses in pre-op and recovery do not remain in one designated position throughout the day; they assist in other areas as they are available.

  • Have an established routine:

    - the cataract surgery patients are discharged from the surgery bed, so there is one less transfer for the patient;
    - patients do not change into gowns prior to surgery; and,
    - recovery room orders from cataract surgeons are standardized.

  • Prepare the patient pre-procedure:

    - review the discharge instructions with the patient (and their family) during the pre-op time, so that only brief reminders are necessary during the recovery time; and,
    - involve family members in the patient's surgery process to the extent possible.

Intra-Operative Complications / Non-Routine Procedures: Capsular Tears and Intra-Operative Floppy Iris Syndrome (IFIS)

• Of the 28 procedures listed as complicated were:

  - Floppy iris (1);
  - Floppy iris with suture (1);
  - Aborted procedure with post capsular tear (1);
  - Posterior capsular tear (6); and,
  - Posterior capsular tear and vitreous prolapse/vitrectomy (4).

• Forty-five cases (2.6%) were reported as having complications (28) or not routine (17), and not included in the procedure time benchmark (comparison of participating organizations) or aggregate (grouping of all cases together) analyses.

• Among the 17 non-routine cases were:

  - "Detrol" (tolterodine tartrate – an alpha blocker – 1);
  - "Flomax" (tamsulosin – also an alpha blocker – 1);
  - "Floppy iris syndrome" (3); and,
  - "IFIS [intra-operative floppy iris syndrome]/suture" (1).

As noted above, the AAO cites a rate of 1.8% for capsular rupture in cataract surgery. [3] The rate in this study was 0.6% (11/1756). Almost 18% of the intra-operative complications or nonroutine cases reported were associated with IFIS.

For each case documented in this study, organizations were asked whether the patient was taking tamsulosin (Flomax), a medication associated with IFIS. [8] If this question was answered affirmatively, organizations were then asked whether they were taking any measures to prevent IFIS, and if so, what. In 4% (61/1711) of uncomplicated, routine cases, patients were reported to be taking Flomax. For 75% of them (46/61), organizations were taking measures to prevent IFIS. Multiple measures could be employed by one organization. The most popular preventive measures used were:

- Iris hooks, ring, or other device (14);
- Viscoelastic (11);
- Lidocaine/'Shugarcaine' (8);
- Epinephrine or adrenaline (6);
- Atropine (5); and,
- Patient discontinuation of the medication prior to surgery (5).

The American Society of Cataract and Refractive Surgery (ASCRS) addressed IFIS in a "White Paper." They find that pupil stretching is "ineffective" and "stopping the alpha(1)-antagonist preoperatively is of questionable value." [9]

Possible Post-Operative Infections and Preventive Measures Employed by Study Participants

Within two weeks following their procedures, approximately 90% (1545/1711) of patients were contacted by telephone to obtain information about their outcomes. Ninety-nine percent of respondents (1537/1545) answered the telephone survey question regarding whether they had unscheduled contact with a doctor or the facility for reasons other than routine follow-up or unrelated physical problems (i.e., brain aneurysm, bronchitis) since surgery. Of them, 6% (92/1537) responded affirmatively. Five cases did not list a reason for unscheduled contact. There were 1.9% (29/1537) of respondents listing reasons that were *possibly* associated with infection:

- Eye inflammation (12);
- Pain control or medication refill(16); and,
- Vision and pain (1).

The AAO lists cites an endophthalmitis rate of 0.74% (0 to 1.9) in cataract surgery. [3] MedPac has found a rate of 1.64 for Medicare fee-for-service patients in outpatient departments (OPDs) and 1.05 for ambulatory surgery centers (ASCs). [10]

For cataract surgery, the American Academy of Ophthalmologists recommends the use of povidone iodine in the eye to prevent infection. [3] A recent study reviewing povidone iodine protocols in more than 10,000 cases suggests that pre-operative skin disinfection with 10% povidone-iodine and conjunctival disinfection with 5% povidone-iodine, significantly reduced the relative risk of post-operative endophthalmitis. [11] In almost 100% (1709/1711) of cases, AAAHC Institute study participants reported whether povidone iodine was used in the eye. Where this question was answered, in 99% (1690/1709) of cases, povidone iodine was used in the eye. Patient allergy to iodine would be a contraindication to this recommendation. In cases where povidone iodine was not used (19), for 74% (14) it was indicated that the patient had an allergy to iodine.

Conclusions

As illustrated in Figures 1 and 2, there is great variation in average pre-procedure and discharge time by organization. Those organizations with the shortest times offer many suggestions for decreasing the times that include common themes of using pre-printed forms and instructions, and communicating with and preparing the patient/family prior to the day of surgery. Another important theme is studying patients' special needs, patient flow, surgeon speed, and staffing, then using this information to anticipate changes in scheduling and patient arrival instructions, as well as increasing or moving staff.

The rate of one of the most important intra-operative complications, capsular rupture, was relatively low in this study (0.6% versus 1.8% cited by the AAO). At the same time, almost 20% of the intra-operative complications or non-routine cases reported were associated with IFIS, and some of the most popular strategies employed by participating organizations to prevent such issues do not appear to be very effective. [9] As more of the population in the United States becomes older and more likely to use alpha blockers, IFIS promises to increase. Addressing the issue of IFIS during cataract surgery has become more important. Research on best strategies is emerging.

From information provided by patients about symptoms associated with unscheduled contact with the physician or facility, it appears that post-operative infections may occur in as many as 1.9% of the patients studied. This happens despite participating organizations' rigorous use of povidone iodine to prevent endophthalmitis. One promising area of research suggesting an approach to this issue is the identification of patient characteristics that may be associated with risk for negative outcomes from cataract surgery. [10] It may be necessary to examine risk factors for endophthalmitis and provide special follow up with patients at risk.

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An investigation into patient morbidity following oral day case surgery

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Abstract

Background: Spinal anaesthesia is a common technique for day case

Aim: To investigate morbidity following oral day case surgery.

Methods: 50 patients attending for day stay surgical removal of impacted mandibular third molar teeth completed a nurse led telephone questionnaire at 24hrs.,3 days and 7 days post surgery to characterise their experiences.

Results: 48 patients responded at 24hrs., but this fell to 41 at day 3 and to 30 by day 7. Whilst there was a general improvement in post-operative pain, nausea, headache, sore throat and difficulty sleeping during the study period, day 3 was associated with increased pain experience, a need for 'additional' analgesia, disturbed sleep due to pain and an increase in patients seeking 'additional' medical advice. Overall. 74% of respondents felt their day case experience was 'better than' or 'as expected' with return to normal activity taking around 5 days.

Conclusion: Recognition of the need for improved pain management, particularly around the third post-operative day, and the wide range of additional morbidities consequent upon oral surgery has helped develop our clinical and nursing practices to improve the quality of ambulatory care for these patients.

Keywords: Oral day case surgery; Post-operative morbidity.

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Introduction

The Oral Surgery Day Case Unit is a purpose built facility within Newcastle Dental Hospital which provides surgical and dental treatment for approximately 2500 patients annually under general anaesthetic [1,2]. Removal of impacted third molar teeth is one of the more common procedures undertaken in the unit 2.

Morbidity following oral surgery procedures is variable, but previous studies have demonstrated significant pain and discomfort immediately following third molar surgery [3,4,5,6,7]. We have investigated both the use of different analgesic regimes to improve post-operative pain management and also demonstrated the usefulness of telephone questionnaires following day surgery to monitor patient progress [2,3].

Whilst our previous nurse-led telephone study confirmed that as many as half of our day patients reported feeling 'not very well' 24 hours after oral day case surgery, little is known about patients' experiences in the succeeding days following surgery. In particular, little attention has been given to identification of symptoms other than pain.

The aim of this study was therefore to evaluate in more detail patients' experiences and postoperative morbidity during the 7 days following their attendance for oral day case surgery.

Methods

Following ethical approval, 50 consecutive adult patients attending the day unit for removal of bilateral impacted mandibular third molars were recruited into the study. All patients were of ASA I or II fitness and were asked to give written informed consent to participate in the study. Standardised anaesthetic and surgical protocols were defined and applied by the same anaesthetist (IRF) and surgeon (PJT) in each case (Table 1).

Table 1 Anaesthetic and Surgical Protocols

Anaesthetic Protocol

1. Induction- Fentanyl, 1mg per kg body weight
   Micvacurium, 0.1mg per kg body weight
   Propofol, 1.5-2.5mg per kg body weight as required.
2. Nasal intubation, with spraying of vocal cords with 10% lignocaine
3. Gauze throat pack placed in pharyx
4. Maintenance: Spontaneous respiration via CO_2 absorber, N_20: O2/2:1 Sevoflurane as indicated (1–4%)

Surgical Protocol

1. Bilateral impacted mandibular third molar teeth
2. "Envelope" mucoperiosteal flap reflection
3. Bone removal and tooth sectioning with burs
4. Irrigation and closure with resorbable sutures

Prior to their surgery, patients were asked to rate the presence or absence of pain from their impacted teeth numerically between 0 to 100 (thereby providing a baseline score) using a visual analogue scale (VAS). Post-operatively, after recovery but prior to discharge, patients were again asked to rate their pain using an identical VAS.

On discharge, patients received a standard post-operative analgesic regime (Table 2), instructions were issued on the safe use of 'additional' analgesics (such as ibuprofen) and a description given of likely post-operative symptoms such as facial swelling, numbness of the lip, chin, or tongue, bleeding and infection.

The study required patients to be available to receive telephone calls on an agreed number at a designated time at 24 hours, 3 days and 7 days post-operatively. The call was made by the day unit nurse who had coordinated the patient's ambulatory care on the day of surgery, using a structured and previously validated questionnaire 2 (Table 3).

Table 2 Discharge analgesia.

Two tablets of cocodamol 6 hourly (codeine phosphate 8mg, paracetamol 500mg per tablet)
Escape analgesia was available for all patients in the event of post operative discomfort: Ibuprofen 400mg
Antiemetic: Ondansetron 8mg if required.

Table 3 Post-operative questionnaire given at 24 hours, 3 days and 8 days.

1. How have you felt since your operation	*Very well/average/not very well*
2. Have you experienced pain from the site of your operation?	*Yes/No*
3. If Yes, how would you rate the pain on a scale of 0–10?	
4. Have you used the "pain killing" tablets prescribed for you after your operation?	*Yes/No*
5. If Yes, how effective were they?	*Very effective/reasonably effective/not very effective*
6. Have you used any "additional" pain killing medication?	*Yes/No*
7. If Yes, what?	
8. Have you experienced any nausea or vomiting?	*Yes/No*
9. Have you experienced any headache ?	*Yes/No*
10. Have you experienced sore throat ?	*Yes/No*Yes
11. Have you experienced drowsiness or tiredness ?	*Yes/No*Yes/No
12. How well have you slept since we last spoke to you?	*Very well/average/not very well*
13. If not very well, why?	
14. Have you experienced any other problems since we last spoke to you?	*Yes/No*
15. If Yes, what?	
16. Have you needed to contact your doctor/dentist or NHS direct for help or advice?	*Yes/No*
17. If Yes, why?	
Day 7 only: 18. When did you return to your normal range of activities after your operation?	
19. How would you describe your overall experience of oral day case surgery?	*Better than expected/as expected/ worse than expected*

If there was no reply to the telephone call, the nurse would call again later that day to try to ensure questionnaire completion. If it proved impossible to contact patients at any of the specified study periods, attempts were still made to contact patients at the next time point in order to complete as many questionnaire responses as possible.

After examining normality in distribution of data, statistical comparisons of responses at 24hrs, day 3 and day 7 were carried out using Pearson Chi square analysis and Wilcoxon signed rank tests using SPSS software.

Results

14 male and 36 female patients participated in the study (mean age= 28.6 years, sd =8.65). 50 patients successfully completed VAS scores pre- and post-operatively with mean preoperative pain scores recorded as 7.26 (SE=2.11) and post-operative scores much higher at 50.22 (SE=3.51). This difference was significant ($p<0.01$).

48 patients completed telephone questionnaires at 24 hours post-operatively. Of the 2 participants who were not available at 24 hours, one reported being 'too unwell' to answer the 24 hour call when responding on day three, and the other failed to complete any questionnaires.

Questionnaire response fell to 41 patients on day 3 and reduced again to 30 at day 7. All 9 patients that were uncontactable on day 3 were also unavailable on day 7.

In relation to the question 'How have you felt since your operation?', 52% of respondents reported feeling 'not very well' at 24 hours, but this dropped to 37% on day 3 and was less than 10% on day 7. These differences were significant between day 1 and day 3 ($p<0.01$) and also between day 1 and day 7 ($p=0.01$) (Figure 1).

Between 70 to 80% of patients reported pain from their operation site on days 1 and 3, but this reduced to 40% by day 7 (Figure 2). Analysis of mean VAS pain scores showed a significant fall between 60.1 recorded on day 1, 52.6 on day 3 and 35.3 on day 7 ($p=0.05$) (Figure 3).

When asked if the prescribed 'pain killing' tablets had been used post-operatively, 89% of patients reported using them on day 1 compared with 73% on day 3 and 41% on day 7. A statistically significant

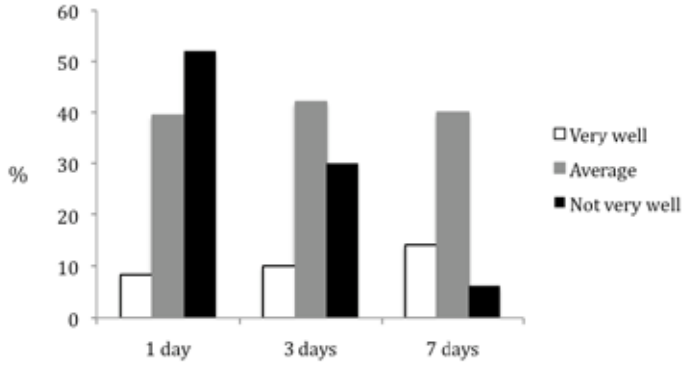

Figure 1 How have you felt since your operation?

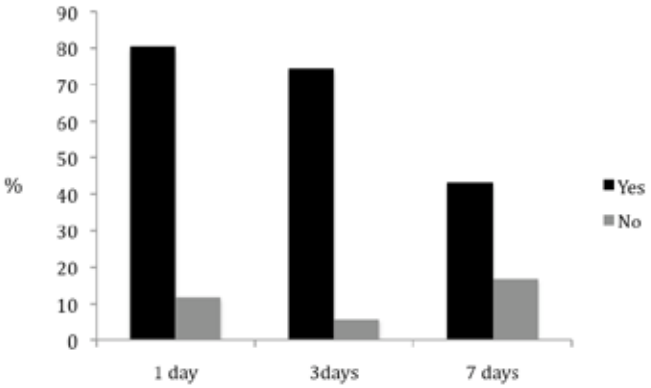

Figure 2 Have you experienced pain from the site of your operation?

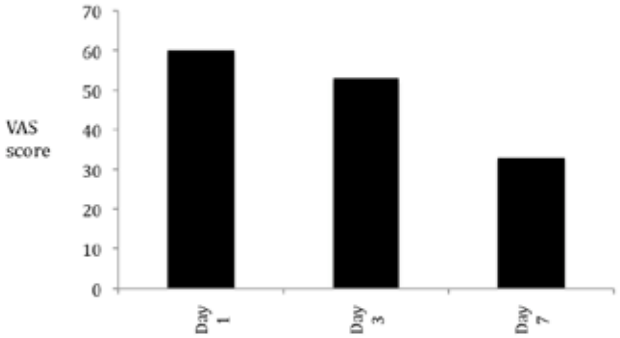

Figure 3 Mean VAS pain scores (Days 1, 3 and 7).

difference in analgesic use was only seen between days 3 and 7 ($p<0.05$) (Figure 4).

Nearly 30% of patients found the prescribed 'pain killing' tablets 'very effective' on day 1, but this fell to 15% and 7% on days 3 and 7 respectively. Whilst the majority of patients found their analgesics to be 'reasonably effective' throughout the study, there was a rise in reporting 'not very effective' between 19% on day 1 to 26% on day 3, before falling back to < 10% on day 7. The difference in effectiveness of painkillers was significant between days 1 and 3 ($p=0.032$) and between days 3 and 7 ($p=0.013$) (Figure 5).

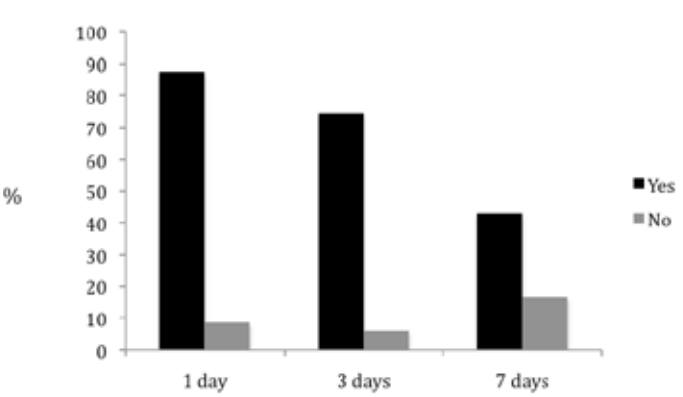

Figure 4 Have you used the "pain killing" tablets prescribed for you after your operation?

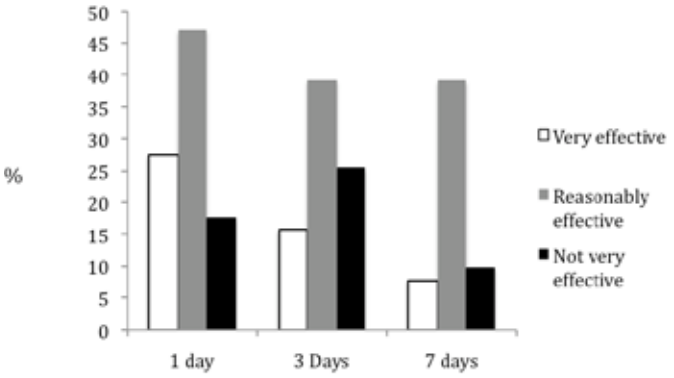

Figure 5 How effective were the prescribed "pain killing" tablets?

More patients used additional 'pain killing' medication on day 3 (62%) compared with days 1 and 7, with ibuprofen the most commonly used additional medication in nearly half of cases (Figure 6).

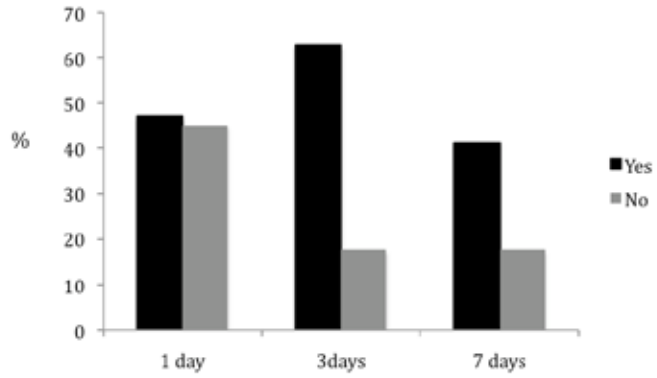

Figure 6 Have you used any "additional" pain killing medication?

With regards to post operative nausea, there were significantly more patients experiencing nausea at day 1 (40%) than day 3 (24%) or day 7 (4%) and this difference reached statistical significance ($p=0.035$) (Figure 7). Male patients reported significantly more nausea than female patients ($p=0.016$).

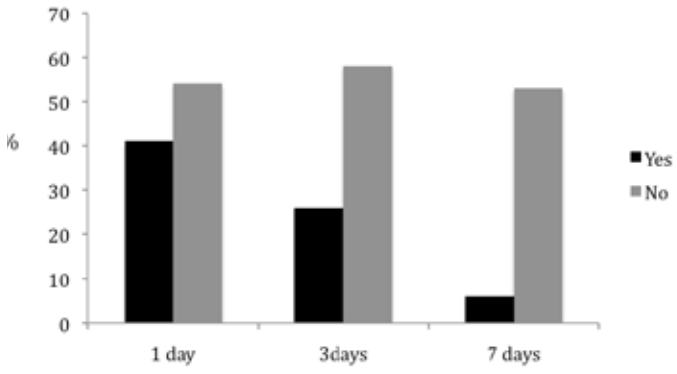

Figure 7 Have you experienced any nausea or vomiting?

Figure 8 shows that just under 50% of patients experienced headaches at 24 hours, but this fell to 33% on day 3 and 25% by day 7 ; this was significant between days 3 and 7 and was more apparent in female than male patients ($p<0.05$).

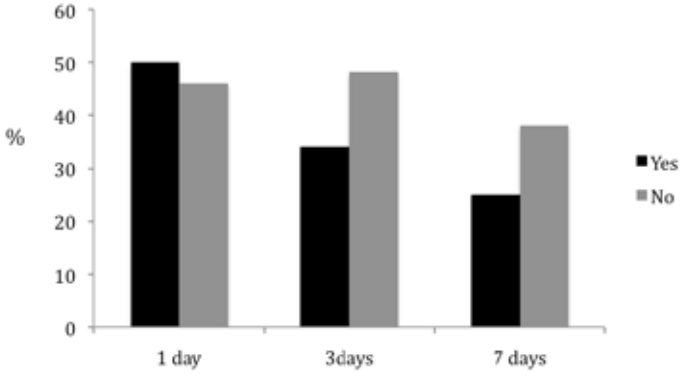

Figure 8 Have you experienced any headache since we last spoke to you?

Sore throat was most common on day 1 (80% of patients) compared to 60% on day 3 and <30% by day 7 (p=0.043) (Figure 9).

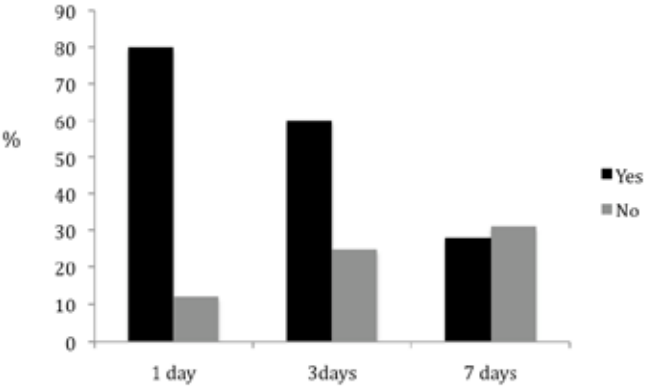

Figure 9 Have you experienced a sore throat?

Drowsiness was experienced most commonly on day1 (80%), dropping to 50% on day 3 and 28% on day 7 ; this was particularly significant between days 1 and 3 (p<0.01) but also between days 3 and 7 (p=0.03) (Figure 10). Drowsiness was more common in patients over thirty years old (p=0.042).

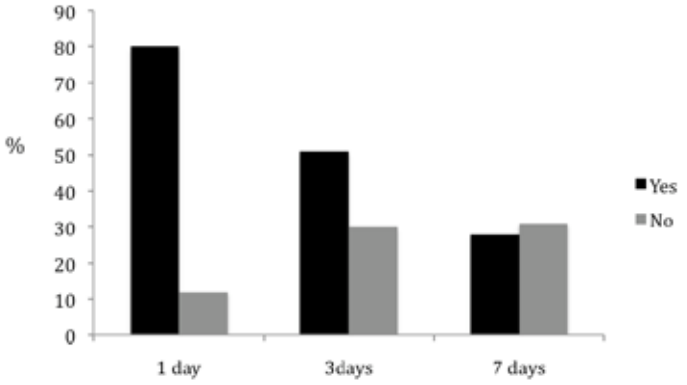

Figure 10 Have you experienced drowsiness or tiredness since your operation?

Figure 11 shows that disturbances in patients' sleep pattern was most common on day 1 (nearly 40% not sleeping well) but improved during the study period so that only 14% recorded not sleeping well by day 7 (p=0.015). Disturbed sleep was significantly worse in those under 30 years of age (p=0.016), with pain the most common reason especially on day 3 (Figure 12).

Relatively few patients reported 'other problems' during the study, although they were most common at day 3 (Figure13) ; these were primarily complaints relating to swelling, bleeding or numbness.

Whilst there were no significant findings related to patient's seeking

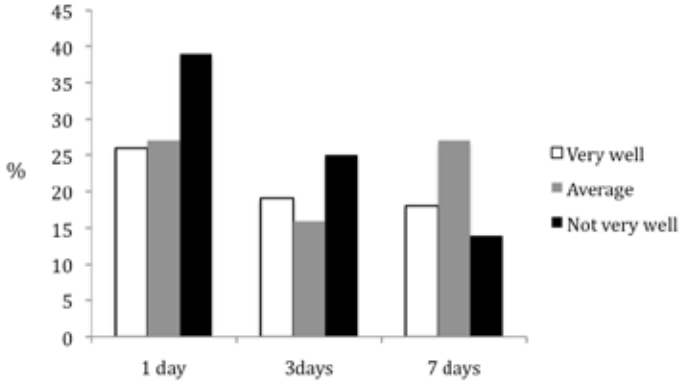

Figure 11 How well have you slept since your operation?

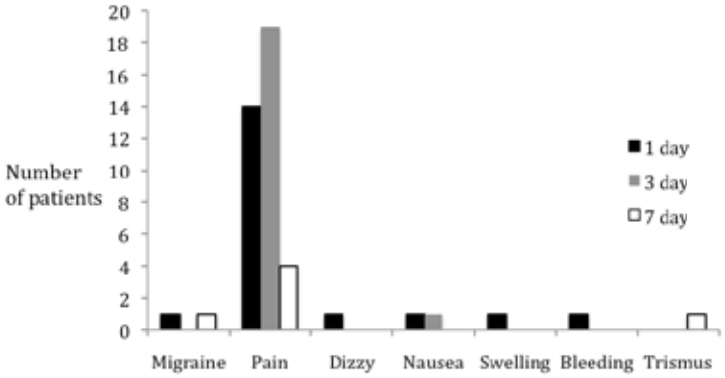

Figure 12 Patients' reasons for not sleeping well.

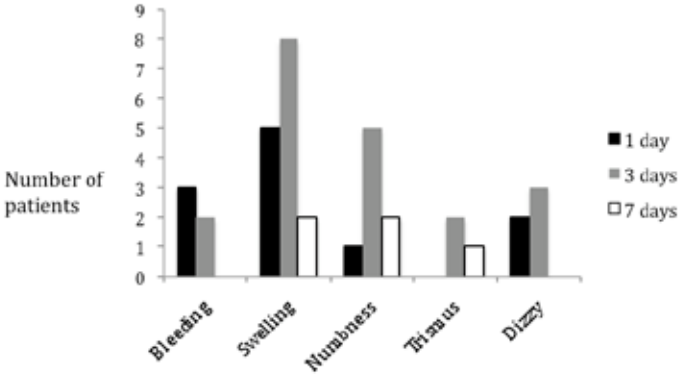

Figure 13 "Other problems" experienced during the course of the study.

additional medical assistance from doctors, dentists or NHS Direct during the study, this was most commonly reported on day 3 and overall, 44% of patients did seek additional medical advice (Figure 14).

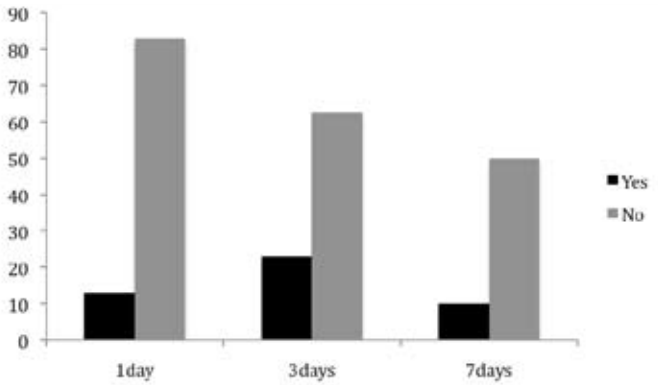

Figure 14 Have you needed to contact your Doctor, Dentist or NHS Direct?

The mean time to return to work or normal activities for patients in this study was 5.03 days. 74% of patients reported that their overall experience of day case surgery was 'better than' or as 'expected'.

Discussion

Patient involvement in assessing the effectiveness and quality of ambulatory care provision is mandatory in modern health care provision. This study adds significant additional information to our understanding of patients' experiences following oral day case surgery, particularly in relation to symptoms and complications during their first days at home.

When patients are reviewed in clinic to ascertain post-operative progress and to identify surgical complications, it is typically several weeks after surgery and contemporaneous data is usually lost. By contacting our patients at 24 hours, and again on the 3rd and 7th postoperative days we have recorded a unique and accurate summary of their immediate postsurgery course.

Although this is a small cohort study of 50 patients, we have previously demonstrated the reliability of nurse-led telephone questionnaires in patient follow up studies [2]. 20 patients were uncontactable at 7 days, presumably because they had recovered sufficiently to return to their normal work or activities, so questionnaire data at this time may be biased towards the 30 responders. Information obtained at day 1 and 3 (41 to 48 patients) is probably the most representative therefore.

Post-operative VAS pain scores confirmed a significant incidence of pain immediately following surgery and pain was still a common complaint in 80% of patients at 24 hours.

Whilst the severity of pain decreased over the study period, several of the 7 day responders still required regular analgesia.

Ibuprofen was the most commonly used 'additional' analgesia by patients and, assuming no contraindications exist for individual patient use, this may be an important addition to our standard discharge medicine protocol.

It is interesting to note that day 3 in particular was associated with increased pain experience for many patients, with reports of prescribed analgesics being less effective and a need for 'additional' analgesics and more episodes of pain disturbed sleep recorded at this time point. From the patients' perspective, their post-operative period may be associated with significant other morbidities in addition to pain. Facial swelling at the operation site, sore throat, nausea, headache, drowsiness and difficulty sleeping were all commonly experienced. It is also noteworthy that 44% of study patients sought 'additional' medical assistance or advice during the post-operative week, most frequently at day 3 and primarily because of pain, swelling, trismus and concern over post-operative infection. Despite information provided pre-operatively by clinicians during initial consult appointments, and reinforced by nurses in pre-admission clinics, there appears to be a need for improved patient education regarding common post-operative sequelae.

It is encouraging, however, that nearly three quarters of patients reported their oral day case experience as 'better than' or 'as expected' and it is possible this figure might have been higher, because 20 non-responding patients may have already returned early to their normal activities.

The findings of this study have helped us to modify and develop pre-operative and postoperative care pathways, and have proved particularly relevant in better informing and reassuring patients about their impending day surgery experience.

Conclusions

Information on patients' experiences following nurse-led telephone questionnaires has helped identify a number of new findings in relation to post-operative morbidity in oral day stay surgery. Recognition of the need for improved pain management, particularly around the third post-operative day, and the wide range of additional morbidities consequent upon oral surgery has informed and developed clinical and nursing practices to improve the quality of patient care.

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Longitudinal changes in health and symptoms following laparoscopic cholecystectomy

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Abstract

Background: Spinal anaesthesia is a common technique for day case Aim: To investigate the progress of recovery up to 6 months following laparoscopic cholecystectomy concerning patients' perception of their health, symptom occurrence, degree of distress caused by each symptom and if gender differences exist in relation to these variables.

Results: Patients' perception of health improved, mainly caused by increased physical well-being, between day 7 and 1 month. Symptom occurrence and symptom distress decreased rapidly during the first post-operative week. Pain and loss of appetite were further resolved at 1 month. However, 30% of the patients had at least one distressful symptom at 6 months which calls for further investigation.

Conclusion: Post-operative distressful symptoms last longer than generally thought.

Keywords: Laparoscopic cholecystectomy; Day case; Post-operative symptoms.

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Introduction

Laparoscopic cholecystectomy (LC) is one of the most common surgical procedures in the western world. Approximately 50,000 cholecystectomies are performed every year in England and 500,000 in the United States [1]. Gallstone disease typically affects fertile women aged 40-60 years who are slightly overweight [2]. LC is a treatment intended to relieve pain and other symptoms of gallstones. Pain disappears in most patients after surgery. However, some patients are not relieved of their symptoms and, in some cases, the onset of new symptoms has been reported [3].

Investigations into long term outcome following LC have earlier focused on persistent symptoms of gallbladder disease such as pain, dyspeptic symptoms and gastrointestinal related quality of life [4-11]. Resolution of abdominal pain ranges from 57% to 88%, and failure to achieve pain relief is the major reason for poor long term results after LC [11]. Although biliary pain is specific for gallstones, 80% of the patients report other abdominal symptoms [12-14]. A pain history of long duration, constipation and abdominal bloating is related to poor outcome after LC [12-14]. In an earlier qualitative study [15] we investigated patients' experiences during the first post-operative week following LC. Post-operative pain varied to a great extent and several patients had a relapse of pain on the third day lasting up to 1 week. Moreover, bloating was a problem. However, how distressing the experienced symptoms are in the long-term perspective is scarcely investigated.

Improvement in gastrointestinal symptoms and health related quality of life following cholecystectomy has been reported [6, 7, 9–11, 13]. Further, patients' perception of subjective health after LC has also been reported to improve after a followup of on average 17.1 months [5] , or remain unchanged three months following surgery [10]. Gender differences exist among healthy individuals but whether men and women manifest different symptoms in the short term and the long term during their postoperative recovery following LC has not been clearly established.

The present study focuses on the long term outcome following LC. The primary aim was to investigate the progress of recovery for up to 6 months with special reference to patients' perception of their health, symptom occurrence, and degree of distress caused by each symptom. A secondary aim was to examine whether gender differences exist in relation to these variables.

Methods

Patients

The study was conducted at the outpatient surgery department at a university hospital setting in Sweden. During the period of May 2002 to September 2005 patients who fulfilled the following inclusion criteria were consecutively invited to participate: ultrasonography documented cholelithiasis, scheduled for LC, physical status class I-II according to American Society of Anaesthesiologists, 20-70 years old, and able to understand and speak Swedish. Moreover, the patients needed support from an adult carer at home for the first night following LC. Exclusion criteria for patients undergoing LC in day surgery were immunodeficiency, HIV, previous upper gastrointestinal tract surgery and proven malignancy.

We randomized 100 patients to undergo LC either as outpatients (n=50) or inpatients (n=50). Seventy-seven patients finally received surgery and treatment according to protocol, and of these a total of 73 patients responded to questionnaires about symptom occurrence, symptom distress and subjective health during the whole 6 months study period. Details regarding patient selection and drop-outs are published in a previous paper comparing short-term outcome after in- and outpatient surgery, respectively [16]. As only minor

differences were found between the outpatient and the inpatient groups, these are treated as one single group in this report.

Data collection

Sociodemographic and medical data

A questionnaire designed for this study was used for the collection of background data such as age, sex, marital status and work. Medical data, physical status, body mass index (BMI) and sick leave were collected from the patients' medical records.

Health Index (HI)

The HI first published by Nordström et al.[17], consists of 10 items concerning energy, temper, fatigue, loneliness, sleep, vertigo, bowel function, pain frequency, mobility and general health. For each statement, the participants were asked to rate their health status during the previous week on a four-graded Likert scale, ranging from 1 to 4. The scores are summarized to form a HI ranging from 10 to 40. The higher the score, the better the self-rated health.

A factor analysis performed by Nordström et al. [17] defined two factors – emotional well-being (EWB), consisting of four items (energy, temper, fatigue and loneliness) and physical well-being (PWB), consisting of five items (mobility, sleep, vertigo, bowel function and pain). The general health item was related to general well- being and was thus excluded from the specific subsets [17]. The HI has been tested for reliability in different patient populations with satisfactory results (Cronbach's α 0.77– 0.85) [17, 18]. Data from a Stockholm population group showed a Cronbach's α of 0·74 [19]. The instrument also has been shown to have discriminant validity [17]. The patients responded to the HI pre-operatively and post-operatively at 1 week, 1 month and 6 months.

The Symptom, Frequency and Distress Questionnaire (SFD-LC)

The SFD-LC is a modified version of the Symptom, Frequency, Intensity and Distress Questionnaire (SFID-SCT), developed for patients undergoing stem cell transplantation [20]. Out of the original 23 symptoms, 18 symptoms were considered as relevant for LC patients and used in this study: nausea, vomiting, pain, shivers, fever, breathing difficulties, coughing, tiredness, sore mouth/throat, loss of appetite, diarrhoea, constipation, sleeping disturbances, reduced mobility, depression, anxiety, concentration difficulties and memory deficiencies. The excluded symptoms (loss of hair, mouth dryness, and changes of taste, skin changes, and changed body image) were specifically intended for stem cell transplantation and therefore omitted. In this way the validity of the instrument was weighed against scientific and clinical knowledge of post-operative symptoms following LC. For each symptom listed above, the respondents were first asked if they perceived the symptom ('Yes' or 'No'). If they reported the symptom they were then asked how distressful they perceived each symptom to be (0 = 'No distress', 1 = 'A little distress', 2 = 'Much distress' and 3 = 'Very much distress'). The questionnaire was answered every evening during the first post-operative week, and after 1 month and 6 months following LC. The variable symptom distress is the total number of distress for each individual.

Pain Diary

A pain diary was designed for the study, where patients rated their experienced level of pain every evening on post-operative days 1 to 7, and after 1 month and 6 months, using a 100 mm visual analogue scale (VAS) [21].

Statistical methods and data management

To test differences between two unrelated groups, the Mann-Whitney U-test was used. Friedman's non-parametrical analysis of variance was used to analyze time dependent data, followed by Dunn's test for post hoc testing between consecutive time points. In order to evaluate hypotheses of variables in contingency tables, the Chi-square test was used or, in the case of small expected frequencies, Fisher's Exact Test. McNemar test was used to test differences in proportions between two dependant groups. Significance was accepted at $p<0.05$, but for data on postoperative symptoms on an item level, multiple comparisons were made and therefore $p< 0.01$ was considered significant. Analyses were conducted using STATISTICA 7.0 (StatSoft Inc., Tulsa, OK) except for Dunn's test where GraphPad Prism 4.02 was used (GraphPad Software Inc., San Diego, CA).

Ethical approval

The ethics committee at the Karolinska University Hospital, Huddinge approved the study protocol (Reference number 434/00).

Results

Socio-demographic and medical data for the sample is presented in Table 1. No gender differences were found.

Perceived health

Subjective health was reported pre-operatively and at day 7, 1 month and 6 months following LC. A significant improvement over time was seen for the total HI score ($p<0.001$), as well as for the PWB subscale score ($p<0.001$) (Figure 1). The only significant improvement in health perception between consecutive time points was seen between day 7 and 1 month post-operatively for total HI and PWB, respectively ($p<0.001$). During that time interval, the HI scores

Table 1 Socio-demographic and medical data for the sample of patients (n=73) undergoing laparoscopic cholecystectomy. Data are given in numbers (percent), or median (range). All gender differences were non significant.

	Total	Males (n=19)	Females (n=54)
Age, years	45 (22-67)	48 (25-58)	44 (22-67)
Marital status married-cohabiting : single	59 (81) : 14 (19)	16 (84) : 3 (16)	43 (80) : 11 (20)
Education elementary school : high school/university	17 (22) : 56(78)	4 (21) : 15 (79)	13 (24) : 41 (76)
Work status, working/studying : sick leave/ pension	63 (86) : 10 (14)	19 (100) : 0 (0)	45 (83) : 9 (17)
BMI (body mass index) kg/m^2	26 (21-41)	27 (22-35)	26 (21-41)
Duration of disease, months	14.5 (1-420)	12 (2-78)	12 (1-420)

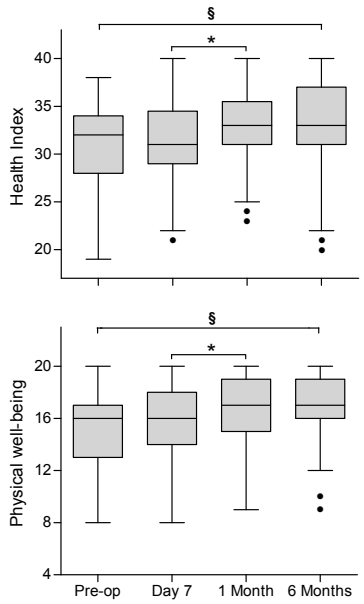

Figure 1 Changes in Health Index and the subscale Physical well-being over four different time points preoperatively (Pre-op), and post-operatively at day 7, 1 month, and 6 months, respectively, in 73 patients after laparoscopic cholecystectomy. Significant changes over time by Friedman's ANOVA are denoted by §, $p < 0.001$. Significant differences between consecutive time points by post-hoc Dunn's test are denoted by *, $p < 0.001$. Data are presented as median (line), 25-75% (grey box), non-outliers (whiskers) and extremes (•).

improved in 42 patients, deteriorated in 10 patients, and did not change in 21 patients. When comparing HI measured on an item level pre-operatively, and at 6 months, a greater proportion of patients reported a significant improvement with regard to pain frequency ($p<0.001$) and bowel function ($p=0.041$) (Table 2).

Females reported significantly lower scores on the total HI day 7 (30.7 vs 32.7; $p=0.042$) and on the PWB subscale compared with men (15.4 vs 16.5; $p=0.038$). No other significant differences were found between the gender groups at any of the measured time points.

Symptom occurrence

In total, the 73 patients reported 527 symptoms (median 7, range 1–15) on the first postoperative day. After 6 months, the corresponding figure was 163 symptoms (median 1, range 0–13). At that time 18 patients (25%) had 1–2 symptoms and 25 (34%) had three or more symptoms. Females reported a significantly higher frequency of symptoms on day 1 (7.7 vs 5.9; $p=0.032$) and day 7 (2.4 vs 0.9; $p<0.001$) in comparison to males. No significant gender differences were seen at the other time points regarding the number of symptoms.

The occurrence of each symptom over time is presented in Figure 2. The three most frequently reported symptoms on the first post-operative day were pain (68%), reduced mobility (67%), and tiredness (67%). These symptoms were also most frequently reported on day 7. Fifteen of the 18 symptoms (pain, reduced mobility, tiredness, nausea, loss of appetite, constipation, coughing, sleeping disturbances, difficulty to concentrate, sore mouth/throat, depression, anxiety, shivers, breathing difficulties, and vomiting) were significantly less frequently reported on post-operative day 7 in comparison to the first post-operative day.

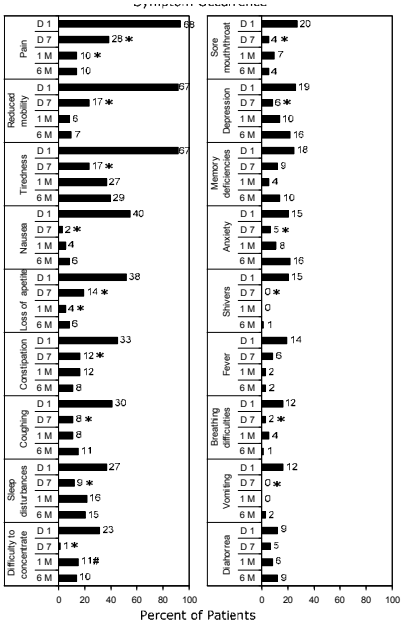

Figure 2 Symptom occurrence. The bars show the percent of patients reporting ongoing symptoms at post-operative day 1 (D1), day 7 (D7), 1 month (1M), and 6 months (6M) following laparoscopic cholecystectomy (n=73). Numbers present the actual number of patients. Significant differences between consecutive time points are denoted by * $p < 0.01$.

At one month, pain and loss of appetite were the only symptoms that were significantly less frequently reported in comparison to

Table 2 Health Index measured pre-operatively and at six months following laparoscopic cholecystectomy (n=73). Data are given as numbers and percent of the patients´ rating their symptoms as 'rather bad/very bad'.

Health Index 'Rather bad/ very bad'	Pre-operatively n (%)	6 months post-operatively n (%)	p-values
Energy	9 (12)	5 (7)	ns
Temper	6 (8)	7 (5)	ns
Fatigue	33 (45)	24 (33)	ns
Loneliness	6 (8)	5 (7)	ns
Sleep	19 (26)	14 (19)	ns
Vertigos	10 (14)	4 (5)	ns
Bowel function	23 (32)	10 (14)	0.041
Pain	32 (43)	9 (12)	0.001
Mobility	3 (4)	1 (1)	ns
General health	11 (15)	9 (12)	ns

day 7, whereas difficulty when trying to concentrate was reported significantly more often. No other symptom reached a significant change in occurrence between one week and one month. After 6 months, no statistically significant differences in symptom occurrence were seen in comparison to one month.

Symptom distress

Fifty patients (68%) reported 'much/very much' distress of at least one symptom on the first post-operative day. The median number of distressful symptoms was 2, range 0–12. The number of patients reporting at least one much distressful symptom after 1 week, 1 month and 6 months were 13 (18%), 14 (19%), and 22 (30%), respectively, a difference that failed to reach significance. The frequency of 'much/very much' distress for each symptom over time is presented in Figure 3. The three most commonly distressing symptoms on the first post-operative day were pain (45%), reduced mobility (40%) and tiredness (36%). In 6 of the 18 symptoms (i.e. pain, reduced mobility, tiredness, nausea, loss of appetite, and constipation) 'much/very much' distress was significantly less frequently reported on post-operative day 7 in comparison to the first post-operative day.

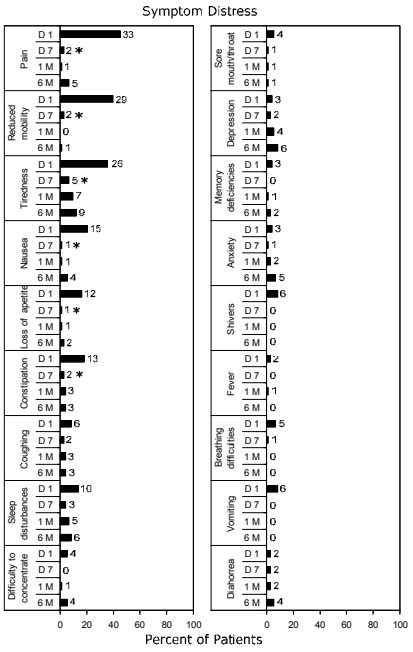

Figure 3 Symptom distress. The bars show the percent of patients reporting symptoms as 'much/very much' distressing at post-operative day 1 (D1), day 7 (D7), 1 month (1M), and 6 months (6M) following laparoscopic cholecystectomy (n=73). Numbers present the actual number of patients. Significant differences between consecutive time points are denoted by * $p < 0.01$.

At one month after surgery, tiredness was the most frequent distressing symptom reported by 10% of the patients. In comparison to 1 week after surgery, there were no differences with regard to the frequency of distressing symptoms. At 6 months after surgery, tiredness was still reported as the most frequent distressing symptom (12%), followed by sleeping disturbances (8%) and depression (8%), but in comparison to one month, no significant changes in the frequency of distressing symptoms were seen.

Table 3 presents the appearance and disappearance of distressful symptoms following LC. Data is dichotomized regarding symptom distress (low distress = no or little distress; high distress = much/very much distress) for all the 18 symptoms in the SFD-LC scale. The total number of reported distressful symptoms decreased significantly between day 1 and day 7 ($p<0.001$), but increased again between 1 and 6 months ($p=0.012$).

In comparison with males, females had a higher proportion of symptoms rated as distressing on post-operative days 1 and 7, when the sum of all 18 symptoms was analyzed (no data shown). However, the proportion of females presenting at least one distressful symptom did not reach significance compared with men at any of the measured time points.

Pain intensity

The highest VAS scores for pain were reported on the first post-operative day. A significant decrease was seen between day 1 and day 7 ($p<0.001$), but at later time points no further differences in pain intensity reached significance (Figure 4). When comparing pain intensity (VAS) between females and males, no significant differences were found between the groups at any of the measured time points.

Sick leave

Sixty-three patients (86 %) were employed, and 58 could return to their work within one week after surgery. Two women needed convalescence for one extra week, and two women and one man had two additional weeks of convalescence.

Discussion

This study focuses on the development of patients' perception of health, symptom occurrence, and symptom distress during the first 6 months following LC. Of 73 patients responding to questionnaires the first week after LC, all were successfully followed-up for 6 months.

The patients' perception of their health was unaffected 1 week after surgery compared to the pre-operative state, suggesting a very rapid recovery after LC for most patients. Thereafter, the perception of

Table 3 Appearance and disappearance of distressful symptoms over time following laparoscopic cholecystectomy. Data have been dichotomized to low (no/little distress) and high distress (much / very much distress), respectively for the 18 symptoms in the Symptom, Frequency and Distress Scale in all 73 patients.

Changes in level of distress	Day 1 vs Day 7	Day 7 vs 1 month	1 month vs 6 months
Constantly low distress	1124	1263	1235
Decreasing over Time (high to low)	165	18	24
Increasing over Time (low to high)	8	26	46
Constantly high Distress	17	7	9
Total opportunities	**1314**	**1314**	**1314**
	p = <0.001	ns	p = 0.0012

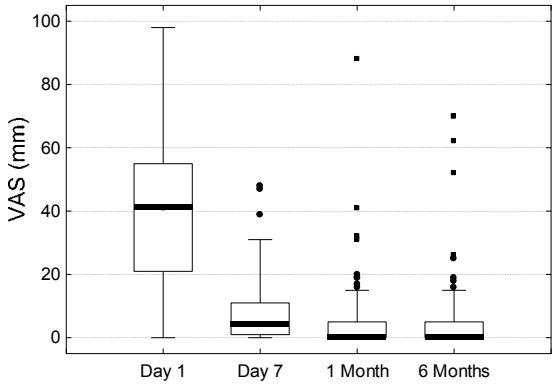

Figure 4 Pain score by Visual Analogue Scale (VAS, mm) among patients (n=73) following laparoscopic cholecystectomy. The bars show the 25-75 percentile, median scores = thick line, whiskers = non outlier range, filled circles = outliers and squares = extremes.

subjective health significantly improved over time, mainly related to an improvement in the physical well-being subscale between day 7 and 1 month post-operatively. Thus, the time course of health improvement after LC has, to some extent, been clarified for this healthy cohort of patients. Several patients were close to the maximum value of the HI, even before surgery, and thus could not improve further. This can have caused a ceiling effect that distorted the results. We think that it might be interesting to investigate patients in poorer health, i.e. those excluded from this study.

Other investigations only measured perceived health at one single postoperative time point for each patient, reporting health improvement after 1 year (n=257) [22] , and 17 months (range 2-32 months, n=56) [5], respectively. It should be noted to the contrary, however, that Quintana et al [10] found no improvement in physical health three months after LC (n=509) and that Giurgu et al 23 reported that emergence of gastrointestinal symptoms 60 months after LC surgery are commonly reported. The vast majority of patients who reported persisting diarrhoea were women while men reported no change in bowel function [23]. A significantly improved bowel function was reported by our patients after 6 months compared with pre-operatively. One problem when comparing different studies is the utilization of different scoring systems for health or quality of life. We used the HI which measures subjective health, emotional and physical well-being, while other investigators used SF 36, a health related quality of life instrument [5, 10, 11, 24].

The patients reported a great number of symptoms on the first post-operative day, but most of them were resolved within the first post-operative week. After one month no further significant improvement in symptom occurrence was noted. Some symptoms were resolved, but new symptoms appeared, leaving the overall prevalence constant although highly dynamic. Weinert et al [11] reported that 6 months following cholecystectomy, out of 2481 patients, 41% had one or two symptoms and 15.5% of the patients had three or more symptoms. Our corresponding figures were somewhat inverted i.e. 25 and 34%, respectively. In line with our study, symptoms occurring de novo have been reported [6, 25, 26].

The most frequently reported post-operative symptoms were pain, reduced mobility and tiredness. The rapid decrease in pain-score during the first post-operative week suggest that this mainly refers to the surgical trauma rather than to symptoms of gallstone disease. Other investigators have reported persistence of abdominal pain ranging from 13% to 37% after cholecystectomy [14, 27]. Persistent abdominal pain is the leading cause of surgical treatment failure (15.2%) [11]. Moreover, unresolved pain is correlated with pre-operative bloating, and constipation [25]. In agreement with our results, reduced mobility after LC has been reported to be a problem during the first few post-operative days [27]. As many as 23% of our patients reported this symptom on the seventh post-operative day, but only 10% after 1 and 6 months.

To fully understand how persisting symptoms affect patients, one must not only consider the presence of symptoms, but also how distressing they are. Few studies have assessed the distress of symptoms in a longitudinal perspective following LC. Finan et al [5] investigated sixteen gastrointestinal symptoms after cholecystectomy where symptom distress of diarrhoea was rated to be 1.3 out of 4, not significantly different from pre-operative scores. In the present study, pain, reduced mobility and tiredness were the most distressing symptoms the first post-operative week. Interestingly, at 1 and 6 months, numerous new symptoms appeared. We speculate that this might be because the patients' symptoms did not depend solely on gallstones. That 30% of the patients had at least one 'much' distressing symptom at 6 months should be distressing for the caregivers and calls for further investigations. However, it might also describe a normal variation of symptom distress in a relatively healthy cohort of persons. For example, through the entire measured period of 6 months, the most persistent distressing symptom was tiredness, reported to be 'much/very much' distressing by approximately 10% of the patients. In a Swedish normal population, severe tiredness is reported by 10% of the females and 5% of the males [28]. Thus, the reported tiredness 6 months after LC seems to be close to the population baseline.

Following LC, Swedish patients have the right to be on sick-leave for the first post-operative week without a doctor's certificate. In our study, this was sufficient for the majority of patients. Pain and medico-cultural traditions are the main factors responsible for prolonged convalescence after LC. To minimize pain and the duration of convalescence, a multi-modal analgesic treatment in combination with short, standardized instructions is recommend [29].

Studies focusing on gender differences in the recovery after LC are scarce, despite the fact that LC is relatively common also among men. In the present study, females reported significantly more symptoms on day 1 and day 7. The overall level of distress associated with these symptoms was also significantly higher in women on the first post-operative day. They also perceived poorer health and worse physical well-being one week after surgery than the male group. This is in accordance with Stefaniak et al [30], who reported that women perceive more post-operative complaints, indicating that they might recover differently from men.

We did not test for gender differences concerning symptom occurrence or distress for each of the 18 symptoms included in SFD-LC or for single items of HI. One important reason for this is that the statistical power of Fischer's exact test or the Chisquare test decreases rapidly when the prevalence of an investigated factor is low. With 19 and 54 subjects in the two groups, respectively, power is 80% to detect a difference in prevalence between 80 and 40% but only 12% to detect a difference between 20 and 10%. Although this is a small group of patients, the findings on the total occurrence of symptoms and prevalence of high distress at 6 months after LC are of clinical interest and should be further investigated in a larger study.

Conclusion

Patients' perception of health improved moderately but significantly over time, an effect mainly caused by increased physical well-being between day 7 and 1 month after LC. Both symptom occurrence and symptom distress decreased rapidly during the first postoperative

week. Only the symptoms of pain and loss of appetite were further resolved at 1 month and thereafter no changes in symptom occurrence were seen. However, 30% of the patients had at least one distressful symptom at 6 months. The occurrence of pain and bowel dysfunction had significantly decreased at 6 months compared with preoperatively.

Further research on persistent distress and gender differences, may lead to a more effective management of symptoms following LC.

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Evaluation of unplanned admission following day surgery at a new surgical centre in London

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Abstract

Aim: Rates of unplanned admissions (UA) are often used as measure of quality and outcome of day surgery [1]. By means of a retrospective study to determine the reasons for UA following day surgery at a new surgical centre over its first 40 months and identifying measures which can be taken in an attempt to minimise these in the future.

Methods: This study includes all elective general surgery day cases performed at The Gateway Surgical Centre (GSC) from 20 October 2005 to 16 February 2009. All those with a UA were identified from registers and databases, and their case notes reviewed.

Results: Over the stated period, 2592 general surgery day cases were performed at GSC, of which 267 (10.3%) required ward admission. Reasons: surgical= 116 (43%), anaesthetic= 67 (25%), medical= 32 (12%), social= 32 (12%), other= 20 (7%). Most common specific causes: wound drain in situ= 15%, post-operative nausea and vomiting (PONV)= 11%, no escort= 11%, not passed urine (NPU) post-operatively= 9%, past medical history (PMH)= 9%.

Discussion: UA due to PMH (n= 25), high BMI (n= 7) and unavailability of an escort post-operatively (n= 30) could have been avoided by better patient selection or improved patient education. Thus, 23% of UA could have easily been avoided. The number of UA could be reduced further by arrangements of care in the community where appropriate and introduction of protocols for post-operative symptom control and discharge.

Conclusion: Most UA occurred due to surgical reasons, the commonest being the patient having a wound drain in situ. A number of recommendations can be made to reduce the number of UA at GSC, thus lessening the burden of a UA for both the hospital and the patient.

Keywords: Day surgery; Unplanned admission.

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Introduction

Day surgery is an attractive option for patients as it allows them to return to their home and family the same day. It also avoids other anxieties associated with hospital stays, such as sharing facilities and the risk of contracting nosocomial infections. Studies have shown that patients who have day surgery tend to resume daily activities and return to work sooner than those who are admitted [2, 3]. Day surgery also benefits the hospital, enabling them to saves resources by avoiding costs associated with ward admission and a greater availability of beds for patients with a greater need. Because of these advantages, the NHS plan [4] proposed that centres should aim for 75% of elective surgery to be performed as day cases.

The Gateway Surgical Centre (GSC) is a purpose-built centre opened in October 2005 as an extension to Newham University Hospital. It was the first NHS Treatment Centre to be built in North East London. The centre deals with elective cases in general surgery, urology, orthopaedics and gynaecology. Clinics also take place in the centre, such as pre-assessment, sports injuries and a fracture clinic. There is a 12-bed day case unit as well as a 30-bed inpatient ward, which is only suitable for clinically stable patients. Any unwell patients are transferred to the main hospital site, where more advanced monitoring and radiological investigations are available.

All day surgery patients are required to attend a pre-assessment clinic prior to their procedure. This is led by a nurse and house surgeon. Their general fitness for surgery is assessed, taking into account factors such as past medical history, examination findings and social circumstances. All patients have routine blood tests, and additional tests such as ECG, X-rays of the chest or C-spine may be requested based on the outcome of pre-assessment. Patients are referred to an anaesthetist if considered appropriate, for example due to potential anaesthetic risk, significant past medical history or high BMI (>35). The structure of this clinic complies with current national guidelines [5-8].

The patient is expected to come to the day case unit on the day of surgery approximately one hour before the theatre list commences. They are then seen by the anaesthetist and surgeons who explain any potential risks and obtain consent from the patient. Following the procedure, the patient is taken to the recovery room until they regain consciousness. They are then brought back to the day care unit. Here their vital signs are monitored regularly until discharge.

There are no official discharge criteria proformas or scoring systems used at GSC. This decision is made by nursing staff based on clinical judgement. Patients are generally considered fit for discharge once they are fully alert, have had stable vital signs for 3 hours, are mobilising as appropriate, have passed urine, have good control of pain, nausea and vomiting, are not bleeding excessively from the wound site and have a responsible adult to accompany them home. In addition, some nursing staff expect the patient to be tolerating oral fluids prior to discharge. Patients are usually discharged within 3 hours of return from the recovery room. The day care unit closes at 9pm. Therefore, patients who are not fit for discharge by this time are admitted to the inpatient ward. Such cases are classed as unplanned admissions (UA) and indicate failure of the system, increase costs for the hospital and may be an inconvenience to the patient. Therefore, rates of UA are often used as measure of quality and outcome of day surgery [1].

Aim

To determine the reasons for unplanned admission in general surgery day case patients over a 40-month period and make recommendations to reduce avoidable admissions in the future.

Patients and Methods

This is a retrospective study which includes all general surgery elective day cases carried out at GSC between 20th October 2005 and 19th February 2009. All UA were identified through databases and registers. The case notes of these patients were reviewed.

Results

A total of 2592 general surgery day cases were carried out at GSC between 20th October 2005 and 19th February 2009. Of these, 267 (10.3%) had an unplanned admission. The annual breakdown of these figures is shown in Table 1.

Table 1 Annual breakdown of unplanned admissions.

Year	No. of Cases	No. of UA	% of UA
2005 (from October)	181	15	8
2006	768	60	8
2007	795	106	13
2008	761	72	9
2009 (until February)	87	14	16
Total	**2592**	**267**	

The casemix for the patients who had an unplanned admission is summarised in Table 2. The age of these patients ranged from 18–88 years, with a mean age of 49.6 years. Of those with an unplanned admission, 52% (n= 139) were male and 48% (n= 128) female; BMI ranged from 18-54, with the mean BMI being 29 (not recorded for 2 patients) (Figure 1); 111 were classed as American Society of Anesthesiologists' (ASA) I (43%), 116 (45%) ASA II and 33 (13%) ASA III (not recorded for 7 patients).

Table 2 Casemix of unplanned admissions.

Surgical procedure	N
Hernia repair	109 (7 bilateral)
Laparoscopic cholecystectomy	85
EUA Rectum	32
Breast surgery	11
Excision of lump	11
Varicose vein stripping	6
2 in 1 (eg lap chole + hernia repair)	6
Other	8

There were 116 (43%) patients admitted for surgical reasons (Table 3), 67 (25%) due to anaesthetic reasons (Table 4), 32 (12%) for medical reasons, 32 (12%) for social reasons and 20 (7%) for other reasons (Table 5). For 19 patients the procedure was more extensive than planned, 8 due to a planned laparascopic procedure being converted into an open procedure, 4 due to intra-operative bleeding, 4 as the procedure was more difficult than expected, e.g. due to

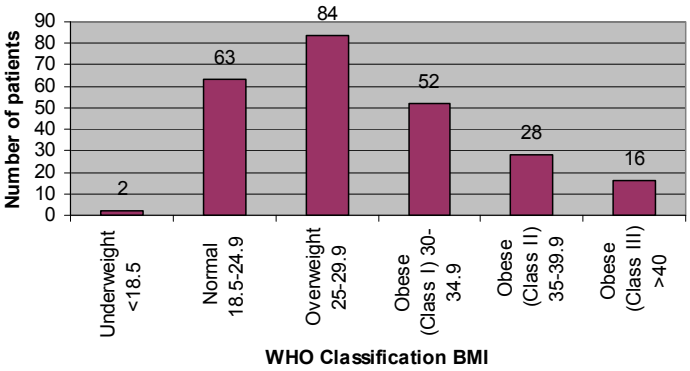

Figure 1 BMI of patients who had unplanned admissions.

Table 3 Surgical reasons for unplanned admission.

Surgical	n	%
Wound drain in situ	41	15
Not passed urine (NPU)	25	9
More extensive procedure than planned	19	7
Pain	18	7
Bleeding	3	1
Wound packing or dressing	3	1
Other	7	3
Total	**116**	**43**

Table 4 Anaesthetic reasons for unplanned admission.

Anaesthetic	n	%
Post-operative nausea or vomiting (PONV)	30	11
Drowsy	13	5
Abnormal vital signs	13	5
Spinal/epidural anaesthesia not worn off	7	3
Other	4	2
Total	**67**	**25**

Table 5 Medical, social and other reasons for unplanned admission.

	n	%
Medical		
Significant past medical history (PMH)	25	9
High BMI	7	3
Total	32	12
Social		
No escort	30	11
Patient request	2	1
Total	32	12
Other		
Patient returned late from theatre	18	7
Reason not known	2	1
Total	20	8

adhesions, and 3 as the defect was larger in size than predicted. Other surgical reasons included nasogastric tubes, intravenous antibiotics and unspecified surgeon's request. Other anaesthetic reasons were possible aspiration (n=2), the patient having to lie flat following a spinal anaesthesia and for observation for potential delirium tremens in an alcoholic patient. In the patients admitted for observation due to a high BMI, the BMI ranged from 35–46 and 4 of these patients were admitted overnight for oxygen therapy.

Length of stay (Figure 2) ranged between 1-59 days with a mean of 2.63 days (not recorded for 17 patients). Most patients just had an overnight stay (n= 205). Five patients were discharged later on the same day but after being transferred to the inpatient ward. Only 20 patients (16%) were admitted for more than 2 nights. The main reasons were urinary retention, wound drains and cases where planned laparascopic procedures were converted to open procedures. Only 5 patients were admitted for more than 4 nights. These were due to significant intra-operative or postoperative complications and these patients were transferred over to the main hospital site.

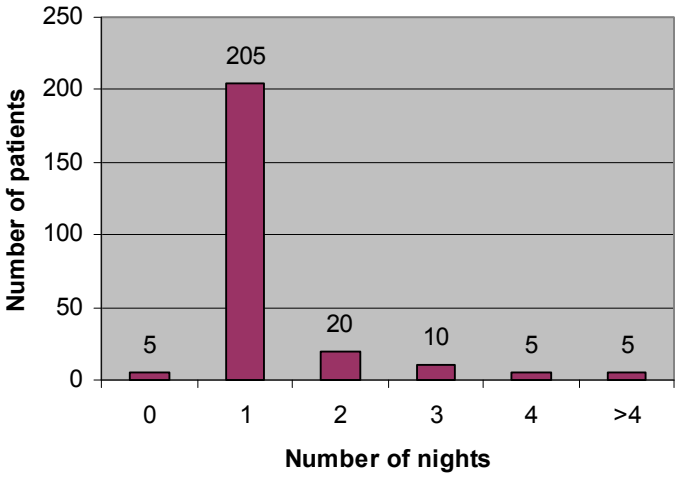

Figure 2 Length of stay for unplanned admissions.

Out of the patients who had an unplanned admission, 17 (6%) were readmitted within 2 months. Reasons were abscess or collection (n= 7), wound infection (n= 4), pain (n=2), PR bleeding following EUA of the rectum (n= 1) and other reasons not directly related to surgical procedure (n=3).

Discussion

The overall percentage of unplanned admission following general surgery day cases at GSC between October 2005 and February 2009 was 10.3% (i.e 1 in 10 patients). Other studies have shown the overall rate of unplanned admission to be 0.28%- 5.9% [3, 9–17], although one multi-centre study found the rate to range from 0.9–9.4% at different centres [17]. In comparison, the figure in our study appears rather high. This could be due to the fact that GSC has inpatient facilities and is based within the grounds of a district general hospital. Therefore, even those that may not be particularly suitable for day cases may be put on the list as, if required, they can easily be admitted. At stand-alone day case units this is probably not the case.

Most unplanned admissions were due to surgical reasons (43%), corresponding with findings in other studies where the value ranged from 38-75% [11–14]. Twenty-five per cent of unplanned admissions were due to anaesthetic reasons, which is comparable with studies where the rate was found to be mainly between 25-28% [11–13] with one study showing 9% [14]. In our study, 12% of unplanned admissions were due to social reasons, which falls within the range found in other studies of 5–20% [12-14]. Another 12% of admissions were due to medical reasons, which is similar to other studies where they accounted for 17% [12, 13]. We can see from Table 1 that there has been no significant difference in the percentage of unplanned admissions over the years. However, what we can comment on is that the rate is not decreasing. Therefore, action needs to be taken in order to aim to reduce this number in the coming years.

The main reason for unplanned admission was the patient having a wound drain in situ (n= 41). If nurses received training to care for these drains in the community then such patients could go home with their drains and not require admission for this reason. Wound packing or dressings should also be managed by district nurses in the community and should not require admission. This appears to be the case as the last admission for this reason was in October 2007.

The next most common reason for admission was PONV (11%), which accounted for 6–17% in other studies [10, 12, 13, 15, 17]. This should be minimised by optimal use of peri-operative anti-emetics. The requirement to be tolerating oral fluids prior to discharge has been criticised and it is thought that this may induce nausea and vomiting [5, 18–20]. It has been suggested that patients should be allowed to go home regardless with appropriate advice on PONV and the risks of dehydration [5].

Admissions for pain management (7%) have decreased over the years, with only 2 admissions for this reason in 2008. This is likely to be due to better use of perioperative analgesia and this should be maintained to keep the number of admissions due to this reason low. In other studies this has ranged from 3–26% [10, 12, 13, 15, 17]. There is no set protocol used at GSC for prophylaxis for PONV and postoperative pain management, and anti-emetics and analgesics are selected at the anaesthetist's discretion. The importance of having clinical pathways in place for these has been highlighted [12] and the introduction of such protocols could help reduce the number of admissions for this reason.

Another common reason for admission was the patient not having passed urine postoperatively (9%). In other studies this has been shown to be one of the less common reasons for admission [10-13, 15, 17]. This is possibly due to the fact that passing urine is part of the discharge criteria at GSC. It has been suggested that patients need not be admitted purely due to the fact that they have not passed urine post-operatively [5, 21]. Only those at high risk of urinary retention should be required to pass urine prior to discharge, for example, those who have undergone inguinal, pelvic or urological surgery, spinal or epidural anaesthesia, peri-operative catheterisation or those with a history of urinary retention or prostate hypertrophy [3, 5, 22].

This raises the point of developing official discharge criteria at GSC based on current guidelines and scoring systems. Discharge criteria set out by the Royal College of Surgeons [23] focus on social aspects, such as a safe environment at home with appropriate facilities and avoidance of any risk activities. This was extended by the British Association of Day Surgery [24] with added emphasis on symptom control.

There are several scoring systems available to assess fitness for discharge. The most commonly used are the Post Anaesthesia Recovery Score for Day Surgery [25] and more recently the Post Anaesthesia Discharge Scoring System (PADSS) [22], which includes the patient's post-operative symptom control, vital signs and activity.

Admissions to the inpatient ward could also be decreased if the day unit was open until later than 9pm. At this time patients are often not ready to go home, possibly because they have returned late from theatre, but become suitable for discharge later on in the evening. This could apply to patients who are transferred to the inpatient ward due to pain, PONV, NPU or drowsiness. These problems may have resolved later on the same day but the patient would have had to stay overnight as there was no one available to assess them for discharge.

Resident Medical Officers (RMO) are available at GSC. However, they are extremely busy out of hours and are probably more likely to give assessment for discharge lower priority than other tasks such as cannulation and management of active symptoms. Patients are more likely to be asked to stay overnight and wait till the morning ward round for their doctors to assess them for discharge. Out of the patients who had an unplanned admission, 5 were discharged later the same day. These are likely to have been patients who were persistent with nursing staff to arrange for them to be discharged.

In some cases, unplanned admission following day surgery is inevitable and unpredictable. Nevertheless, every effort should be made to keep this number at a minimum. Unplanned admissions which could have been avoided by preoperative identification are those due to significant past medical history (n= 25), high BMI (n=7) or unavailability of an escort (n= 25). Thus, 23% (n= 62) of unplanned admissions could have been easily avoided by better patient selection or better patient education.

According to various national guidelines, fitness for a procedure should be based on the patient's current state of health during pre-operative assessment and not determined by factors such as ASA class, BMI or age [5, 8]. However, the Royal College of Surgeons Guidelines for Day Case Surgery [23] state that patients with a BMI greater than 30 are unsuitable candidates for day surgery. Studies have shown that, despite this, many centres continue to perform day surgery on patients with a BMI greater than 30 [26]. Although there is no absolute limit identified, late complications are more likely in patients with a BMI greater than 40 [5].

It can be noted from Figure 2 that most patients who had unplanned admissions were either overweight or obese. Patients with significant past medical history or high BMI should not be considered for day surgery as well as those who are known in advance to have no escort available on the day of surgery. The importance of having a responsible adult to accompany the patient home following surgery should be highlighted at the pre-assessment clinic. It should also be checked on the day of surgery, and if the patient does not have an escort, they should be encouraged to arrange for one to avoid admission.

Conclusion

There have been 2592 general surgery day case procedures carried out at Gateway Surgical Centre between October 2005 and February 2009. Out of these, 267 (10.3%) of patients had an unplanned admission. Most unplanned admissions were due to surgical reasons (43%). The most common specific reasons were: 1) wound drain (15%), 2) PONV (11%) and no escort (11%), 3) NPU (9%) and observation due to significant PMH (9%). Patients with significant PMH, BMI >35 or no escort should not be considered for day surgery. If these had been considered pre-operatively, 62 (23%) of the unplanned admissions could have been avoided. The number of unplanned admissions can be reduced further by introduction of protocols for discharge and post-operative symptom control, and involvement of district nurses for care in the community where appropriate.

Further Study

This study could be expanded by re-evaluating the data for all general surgery day case patients rather than just those who had unplanned admissions. This way factors more likely to lead to unplanned admission could be investigated. This audit could also be repeated after these recommended changes have been enforced to determine whether they have indeed helped to reduce the number of unplanned admissions.

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