

## Analysis of complications and causes of unexpected hospitalisation in ambulatory surgery

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### Abstract

Unexpected hospitalisation in ambulatory surgery is normally due to inadequate selection of patients, procedures more extensive than those originally planned or postoperative complications. In 18 months, 1000 patients from six different surgical specialities were scheduled for day surgery at a university hospital. Local anaesthesia was used in 33.4% of cases, spinal in 31.9%, general in 21.9%, intravenous in 5.7%, epidural in 3.4% and other types in 3.7%. The most frequent procedures were: hernioplasty 157, herniorrhaphy 131, subcutaneous tumour excision 117, surgical metal extraction 71, laryngeal microsurgery 66 and hydrocoele surgery 62. A total of 11.7% of patients developed some minor complications: urinary retention, wound infection, vomiting, inadequate pain control or wound haematoma. A total of 4.7 of patients needed to be hospitalised and 1.4% readmitted. The most important reasons for these admissions were nausea–vomiting, dizziness, fever, social problems and surgical difficulties. The incidence of complications and unplanned admissions were influenced by anaesthetic techniques and type of pathology but not by age of patients, sex or their ASA physical status. © 1998 Elsevier Science B.V. All rights reserved.

*Keywords:* Ambulatory surgery; Complications; Unplanned admissions; Failure to discharge

### 1. Introduction

There is a tendency in all developed countries to perform more and more ambulatory surgery [1,2]. Correct selection of patients is very important in day surgery but surgeons and anaesthesiologists are under increasing pressure to treat elderly and medically compromised day cases, applying safe and efficient standards of practice [3–5]. An excessive number of complications or unexpected hospitalisations could delay the expansion of ambulatory surgery because of the effect on patients, hospital personnel [6], number of inpatient beds and increasing costs [7].

The rate of complications and unplanned admissions following ambulatory surgery has become an important measure of outcome [3,8]. Certain factors under our control (such as psychological preparation of patients,

premedication or type of anaesthesia) could probably favourably modify this. The aim of this study was to analyze the incidence of complications and the reasons for unplanned hospital admissions and their relation to age of patients, sex, physical status, type of pathology and anaesthetic techniques chosen.

### 2. Patients and methods

In 18 months, 1000 patients from six different surgical specialities (Table 1), were scheduled for day surgery (66% male and 34% female). Their mean age was 47 years (range 12–85). Only 4.1% of patients lived more than 1 h drive from the day surgery unit. The most frequent pathologies are shown in Table 2. According to the classification of the American Society of Anaesthesiology, 65.2% of patients were ASA physical status 1, 31.3% ASA physical status 2 and 3.5% ASA physical status 3. After their arrival at the unit, 1.1% of ambulatory patients were cancelled for medical reasons.

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Standard premedication with 50 mg of ranitidine and 4 mg of ondansetron was used in 95% of patients, 30–60 min before entry to the operating theatre. Low molecular weight heparin (3%) or antibiotics (20%) were used according to the particular criteria of the surgeons. The anaesthesia used was local in 33.4% of cases, spinal in 31.9%, general in 21.9%, intravenous regional in 5.7%, epidural in 3.4% and others in 3.7%.

The length of stay of patients at the unit and the follow up details during the first 30 days of postoperative period were registered in a database elaborated with Stat-View 4.1 program, 1992–1994 Abacus Concepts, Berkeley, CA. Statistical comparisons of qualitative variables were made applying  $\chi^2$  test and *P* values less than 0.05 were considered to be significant.

### 3. Results

Hernia repair, tumour excision, surgical metal extraction and laryngeal microsurgery were the most common procedures (Table 3). The mean duration of surgery was 40 min (range 5–150 min). Intraoperative complications were recorded in 19 patients (1.9%): pain in three cases, local anaesthesia failure in two, difficulty in endotracheal intubation in three, postoperative laryngeal spasm in two, respiratory depression after extubation in one, unplanned extensive surgery in two, minor cardiovascular problems in three, anaphylactic reaction to anaesthetic medication in one, extravasation of local anaesthetic in one and one traumatic puncture in spinal anaesthesia. The mean discharge time of patients was 7 p.m. (range: 10 a.m.–10 p.m.).

No major complications were recorded, but 116 patients (11.7%) developed minor complications in the first 30 days after surgery: urinary retention 2%, wound infection 1.9%, nausea–vomiting 1.5%, inadequate pain control 1.5% (Table 4). There was no statistical influence of sex, age or ASA physical status in global morbidity,  $p = 0.67/p = 0.96/p = 0.56$ , nor in different complications,  $p = 0.45/p = 0.67/p = 0.83$ . However, we found significant differences,  $p < 0.0001$ , when we studied the influence of surgical procedures on the type of

Table 1  
Type of surgery

Speciality	No. of patients
General surgery	463
Orthopedic surgery	230
Urology	169
ENT	89
Ophthalmology	27
Vascular surgery	22
Totals	1000

ENT: Ear–nose–throat.

Table 2  
The most frequent pathologies

Pathologies	No. of patients
Abdominal wall hernia	253 (38 bilat., 8 recurrent)
Subcutaneous tumour	77
Metal removal	73
Laryngeal lesion	66
Pilonidal disease	59
Hydrocoele	59 (4 bilateral)
Anal fissure	30
Bone tumour–cyst	29
Carpal tunnel	27 (4 bilateral)
Cataract	27
Epididymal cyst	26
Meniscal pathology	24

complications. There was a higher incidence of complications in relation to the wound in tumour excision and in relation to anaesthesia in hernia repair. There were significant differences,  $p = 0.005$ , when studying the influence of the anaesthetic techniques employed, with a lower incidence of complications in patients operated under local anaesthesia and the highest under spinal anaesthesia. The latter is secondary to the common use of spinal anaesthesia in hernia repair procedures and the higher rate of urinary retention, 5.4%, caused by this technique.

Hospital admission was necessary in 4.7% of patients and readmission after discharge in 1.4%, without statistical differences between specialities,  $p = 0.2$ , (Table 5). The most frequent causes of these unexpected hospitalisations were nausea–vomiting, dizziness and fever (Table 6). These rates were not statistically influenced by age,  $p = 0.08$ , or ASA physical status of patients,  $p = 0.94$ , but there were differences when comparing procedures  $p = 0.03$ , and anaesthetic techniques,  $p = 0.001$ . Hernia repairs were responsible for most hospital admissions, 9.5%. Hospital admissions were infrequent in patients submitted to local anaesthesia, 1.8%, but

Table 3  
The most frequent procedures

Procedures	No. of patients
Hernioplasty	157
Herniorrhaphy	131
Tumour excision	117
Surgical metal extraction	71
Laryngeal microsurgery	66
Hydrocoele repair	62
Pilonidal cyst marsupialisation	35
Knee arthroscopy	33
Carpal tunnel decompression	31
Hallux valgus correction	29
Internal anal sphincterotomy	29
Epididymal cyst excision	29
Cataract surgery	27

Table 4  
Complications after day surgery (within 30 days)

	Number of patients	%
Mortality	0	0
Major morbidity	0	0
Minor morbidity:	116	11.7
Complications in relation with wound:	52	5.2
Wound infection	19	1.9
Wound haematoma	10	1.0
Wound dehiscence	10	1.0
Fever	6	0.6
Wound haemorrhage	5	0.5
Recurrence	2	0.2
Complications in relation with anaesthesia:	43	4.3
Urinary retention	20	2.0
Nausea–vomiting	15	1.5
Headache	6	0.6
Haemodynamic problems	1	0.1
Dizziness	1	0.1
Inadequate pain control	15	1.5
Others	6	0.6

much more common when using general anaesthesia, 8.8%.

#### 4. Discussion

We are in agreement with Westman et al. [9] who state:—‘A safe return home is a result of well balanced anaesthesia and well performed surgery’—However, a safe return home depends on two other factors, correct selection and good preparation for postoperative discomfort. In units with great experience in ambulatory surgery the general trend is to widen the selection of patients. In spite of this, the inclusion of elderly or ASA 3 patients and complex cases has not increased the number of complications or unplanned admissions probably due to improvements in technique and technology [1,6]. Selection has continued to be adequate. Information about possible complications or postoperative discomfort and detailed instructions about pain relief after discharge are vital if patients are to tolerate the postoperative period and avoid anxiety [1,10,11]. This psychological preparation, combined with high quality nursing care at the unit ensures a safe return home.

Mortality and major complications are very uncommon in day surgery and their rates are even less frequent than in the general population [11,12], but minor complications occur with some frequency.

In the intraoperative period these minor complications, 1.9%, were related to anaesthetic technique and as treatment was undertaken immediately hospital ad-

mission was unnecessary. Only two cases of unplanned extensive surgery needed a delayed discharge time.

A wide variety of minor postoperative complications were found in this study, 11.7%. Though this rate seems too high [13], it includes some problems related to anaesthesia, such as urinary retention, nausea or dizziness for instance, which are never considered as postoperative complications in traditional surgery. The percentages of pain, nausea–vomiting or headache, considered as the most common complaints following day surgery [8], were less than 2%.

Pain control was undertaken using metamizol, a non-narcotic analgesic with a central action and a weak inhibition of prostaglandins’ synthesis. Strict written and verbal instructions were given. Patients in general were satisfied with their analgesic. According to some authors [14,15], successful pain relief could be an important factor in avoiding nausea and vomiting.

Emesis prevention with ondansetron, carried out in almost all cases, should be discussed because it is cost-effective only in high risk patients [9,16,17]. When nausea and vomiting occurred in our series hospitalisation was almost inevitable, (12 out of 15 patients). Other authors had similar findings [3,14]. In future, knowing the association of nausea and vomiting with general anaesthesia, we will try to reduce the use of ondansetron to these patients exclusively.

Headache was a complication in six out of 349 patients (1.7%) operated on under spinal or epidural anaesthesia, as low as the occurrence in other experiences with pencil point needles [18].

Catheterization was necessary for urinary retention in 20 cases and was the most frequent complication. However, the catheter was removed within 1 or 2 h in 17 patients and they were able to go home without delay. In the remainder the catheter was removed within 24 h, but necessitated hospital admission.

Our rate of unplanned admissions was 4.7%, in the middle of the range, 0.1–10% reported in literature [6–8,19]. This is an acceptable rate in the first months of any day surgery unit [20], and it has been shown that with more experience this proportion will normally fall to 1% [5]. Readmissions within 30 days following discharge were rare, 1.4%. In general, the rate is around 1% [16,19], with the exception of the report of Twersky [11], 3.1%. We attribute the low incidence to well planned patient discharge, and avoiding premature decisions. Readmission must be considered a failure of ambulatory surgery and a possible cause of medicolegal problems [1]. Several outcome studies reflect variations in the frequency of unexpected admissions among different surgical specialities [7,8,11]. In our study, general surgery patients developed more problems than the average, 6.7% as against 4.7%. This speciality, together with gynaecological surgery [8] and ophthalmology [7], has a higher risk of admission than urology or pediatric

Table 5  
Incidence of unexpected hospitalisation among specialities

Speciality	Discharged patients	Admissions	Readmissions	Cancelled operations
General surgery	420 (90.7%)	31 (6.7%)	8 (1.7%)	4 (0.9%)
Orthopedic surg.	218 (94.8%)	7 (3%)	2 (0.9%)	3 (1.3%)
Urology	160 (94.7%)	4 (2.3%)	3 (1.8%)	2 (1.2%)
ENT	83 (93.3%)	5 (5.6%)	0 (0%)	1 (1.1%)
Ophthalmology	26 (96.3%)	0 (0%)	1 (3.7%)	0 (0%)
Vascular surgery	21 (95.5%)	0 (0%)	0 (0%)	1 (4.5%)
Totals	928 (92.8%)	47 (4.7%)	14 (1.4%)	11 (1.1%)

ENT: Ear–nose–throat.

Table 6  
Causes of unexpected hospitalisation (admission and readmission)

Causes	Number of patients	Absolute frequency %	Relative frequency %
In relation with surgery	19	1.9	31.1
Fever	6	0.6	
Unplanned extensive surgery	5	0.5	
Wound haemorrhage	4	0.4	
Wound dehiscence	2	0.2	
Wound infection	2	0.2	
In relation with anaesthesia	29	2.9	47.6
Nausea–vomiting	12	1.2	
Dizziness	12	1	
Headache	4	0.4	
Urinary retention	3	0.3	
Social	6	0.6	9.8
Pain	2	0.2	3.3
Miscellaneous	5	0.5	8.2
Totals	61	6.1	100

surgery. Complications related to surgery are more common than complications related to anaesthesia as causes of admissions in many series [7,11] but in our series the reverse was true. 47.6% were related to anaesthesia and 31.1% were related to surgery. Specifically nausea–vomiting was the most frequent reason for inpatient admission as is mentioned in several reports [6,14], followed by dizziness, fever and social problems. Curiously, social reasons were more frequent than inadequate pain control in the present series, as opposed to what is described in the literature [6–8,19]. This is probably due to a difference in attitude of patients when they are not used to ambulatory surgery.

The univariate statistical study made about complications and the unexpected hospitalisation rate found no influence of sex, age or ASA physical status. Although Gold et al. [3] reported in 1989 a weak association of age and ASA score with admission, showing differences between their uni and multivariate logistic studies, the present opinion is that elderly or ASA 3 patients are able to withstand ambulatory surgery. Exacerbation of coexisting medical diseases is uncommon when patient selection is well done [7]. Our statistical study found a relationship between the surgical procedure and complications. There was a clear association between hernia

repair procedures and an increased likelihood of complications or hospital admissions. These operations, in general performed under spinal anaesthesia, were frequently followed by urinary retention and some minor problems with wounds. The study also showed the influence of anaesthetic techniques. Spinal anaesthesia was associated with urinary retention, and general anaesthesia caused the highest percentage of admissions, 8.8%, due to a slower recovery. Like other reports [1,3,6,7] these results induce one to think that an important reduction in the rate of unplanned admissions would be possible if there were an increase in the use of local or regional anaesthesia, because these techniques result in a low incidence of complications, a reduced recovery time, better postoperative pain control and they are well accepted by patients.

In conclusion, although complications and unplanned hospitalisations are uncommon in ambulatory surgery, it could be possible to improve the rates by modifying several customs. With good psychological preparation of patients, more frequent use of local or regional anaesthesia and carefully performed surgery in order to avoid wound complications, problems should happen very rarely or not at all.

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