

# Postoperative admissions from a hospital-based day surgery unit

R Kong, J Wilson, K L Kong

Dudley Road Hospital, Birmingham, UK

Postoperative admissions from a hospital-based day surgery unit were analysed over a two year period (1991–2). The overall admission rate was 5.8% with anaesthesia-related causes accounting for 44% and surgery-related causes for 34% of these admissions. The three commonest anaesthetic reasons compelling postoperative admission were drowsiness or slow recovery, nausea or vomiting, and dizziness or faintness. Certain areas of deficiency in the organization of the unit were identified and changes have been implemented. If a 'best anaesthetic technique' for day surgery could be found, this would surely lead to a reduction in postoperative anaesthetic morbidity compelling admission.

Key words: Day case surgery, ambulatory surgery, unplanned admissions

## Introduction

The advantages of day case surgery in comparison with inpatient surgery have been widely acknowledged. However, the benefits to both hospital and patients are lost when overnight admission is necessary after surgery. The rate of overnight admission may therefore be used as one indicator of a unit's efficiency. By analysing the factors that precipitate hospital admission following surgery it is also possible to assess the contribution of anaesthesia to the early postoperative morbidity.

Many day surgery units have analysed their postoperative admission rates following surgery. However, we felt that it was essential to examine our own performance as the data from other studies would not be directly applicable to our unit. At Dudley Road Hospital day surgery patients are accommodated in a separate ward, but are treated in the main operating theatre, sharing the operating sessions with inpatients. This study was carried out to determine our unit's postoperative admission rate so that a standard could be established for future audit. The factors that compelled hospital admission were also analysed to assess the contribution of anaesthesia to the early postoperative morbidity.

## Method

The total number of patients that attended the day surgery unit under the care of five surgical specialities during a two-year period (1991–2) was recorded from the unit's register. Those patients admitted to a hospital ward after surgery were identified and from their case notes the following were recorded: details of the patient, medical personnel, operation and anaesthetic technique. For each patient the compelling reason for admission was determined. Patients were excluded from further analysis either if they were admitted without undergoing the intended procedure, or if the procedure was performed under sedation (e.g. upper gastrointestinal (GI) endoscopy, endoscopic retrograde cholangiopancreatography (ERCP) and colonoscopy). Descriptive statistics were used to analyse the data.

## Results

Table 1 shows that there was a large variation in utilization of the day surgery unit by the five surgical specialities: gynaecology, urology, general surgery, orthopaedics and oral and maxillofacial surgery (oral/max). The overall admission rate was 5.8% and the number of postoperative admissions in each speciality was generally consistent with the workload, except for orthopaedics which had a disproportionately high admission rate (number of admissions from a speciality divided by the total number of patients treated by that speciality).

Out of the 250 admissions we analysed 157 case notes (63%). One gynaecology and two general surgical patients were admitted without undergoing the intended

---

Accepted: January 1994

Correspondence and reprint requests to: Dr K L Kong, Consultant Anaesthetist, Department of Anaesthesia, Dudley Road Hospital, Birmingham B18 7QH, UK

**Table 1.** Workload and admission rates of surgical specialities 1991–92

<i>Surgical speciality</i>	<i>Total no. patients (%)</i>		<i>Patients admitted (%)</i>		<i>Case notes obtained (%)</i>		<i>Admission rate (%)</i>
Gynaecology	1575	(36)	90	(36)	70	(45)	5.7
Urology	1294	(30)	51	(20)	31	(19)	3.9
General surgery	899	(21)	45	(18)	25	(16)	5.0
Orthopaedics	379	(9)	49	(20)	23	(15)	12.9
Oral/max	181	(4)	15	(6)	8	(5)	8.3
Total	4328	(100)	250	(100)	157	(100)	5.8 (overall)

**Table 2.** Demographic details of patients admitted post-operatively

Age (yr)	30	median
	3–81	range
Sex (M/F)	53/104	34/66%
Weight (kg)	67	median
	16–110	range
Duration of anaesthesia (min)	24	median
	10–100	range
ASA 1	119	75.8%
ASA 2	36	22.9%
ASA 3	1	0.65%
ASA 4	1	0.65%

**Table 3.** Grade of the most senior medical personnel at operation

<i>Grade</i>	<i>Anaesthetist (%)</i>		<i>Surgeon (%)</i>	
Consultant or senior registrar	126	(80)	92	(59)
Registrar	23	(15)	44	(28)
Senior house officer	5	(3)	11	(7)
Grade not known	3	(2)	10	(6)

procedure because of medical complications and 90 case notes were not retrieved. The distribution of surgical specialities in the 157 case notes was broadly similar to the specialities of the 250 admissions, with the exception that relatively more gynaecology case notes were retrieved (Table 1).

#### *Patient details*

The demographic data of the 157 patients is summarized in Table 2.

#### *Grade of most senior anaesthetist and surgeon present at operation*

Table 3 shows that the patients in 80% of the cases reviewed were anaesthetized by either a senior registrar

or consultant anaesthetist. This contrasts with the 59% of cases where the surgeon was of a similar senior grade.

#### *Reasons for admission*

The complications that compelled overnight admission were grouped under four main categories as summarized in Table 4 and their overall frequency is illustrated in Figure 1.

#### *Complications by speciality*

The relative frequency of admission categories varied according to the surgical speciality as shown in Table 5.

#### *Gynaecology admissions*

Sixty per cent of these patients were admitted because of anaesthesia-related complications. Nausea or vomiting, drowsiness or slow recovery, dizziness or faintness and pain accounted for 29, 26, 21 and 19% of anaesthetic causes respectively. More than 40% of the gynaecology admissions followed laparoscopic sterilization and a further 43% had undergone some other laparoscopic procedure. Three-quarters of the admissions that had a surgical complication were due either to suspected viscus perforation or unanticipated extended surgery.

#### *Urology admissions*

Nearly half of the patients in this speciality were admitted because of surgery-related factors such as, extended surgery following cystoscopy, postoperative bleeding and postoperative urinary retention. Some of the patients admitted with urinary retention had been given caudal local anaesthetic injections. Other anaesthetic complications present in this speciality included nausea and vomiting, drowsiness or dizziness.

#### *General surgery admissions*

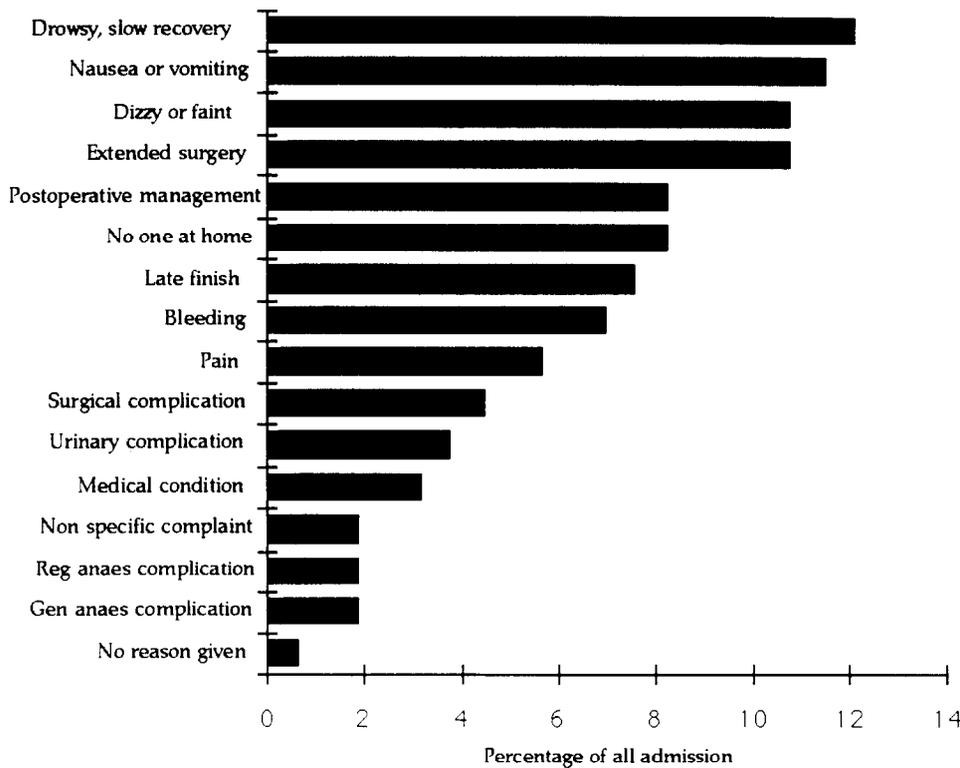
The reasons for admission were equally distributed between surgical, anaesthetic and social and administrative factors.

#### *Orthopaedic admissions*

Eighty per cent of the orthopaedic admissions had undergone arthroscopic surgery and the principal surgical rea-

**Table 4.** Categories and complications that led to postoperative admission

<i>Category (% of admissions)</i>	<i>Complication (% of each category)</i>				
Anaesthesia					
(44)	Drowsiness or slow recovery (28)	Dizziness or faintness (25)	Pain (13)	Nausea or vomiting (26)	General & regional anaesthetic complication (4) & (4)
Surgery	Bleeding	Extended unplanned surgery (32)	Inpatient postoperative management (24)	Surgical technique complication (13)	
(34)	No supervision at home (20)	Too late to discharge home (48)			
Social and administrative					
(16)	Observation of medical condition (52)	Non specific discomfort (56)			
General medical and miscellaneous					
(6)					



**Figure 1.** Frequency of complications that compelled admission

**Table 5.** Distribution of admission categories between the different surgical specialities

<i>Speciality (No. patients)</i>	<i>Gyn (70)</i>	<i>Urol (31)</i>	<i>Gen surg (25)</i>	<i>Ortho (23)</i>	<i>Oral/max (8)</i>	<i>All* (157)</i>
Admission Category	<i>Percentage of admissions from each surgical speciality in the admission category (%)</i>					
Anaesthesia	60	32	28	26	50	44
Surgery	29	48	32	39	25	34
Social/admin	8	16	28	30	0	16
Gen med/misc	3	3	12	4	25	6

\*All specialities.

**Table 6.** Anaesthetic agents used in the patients admitted

	<i>Agents</i>	<i>No.</i>	<i>(%)</i>	
Premedication	Yes/no	20/137	13/87	
Induction agent	Propofol	110	70	
	Thiopentone	43	27	
	Etomidate	1		
	None used	2		
	Not recorded	1		
Antiemetic	Given/not given	48/103	31/66	
	Not recorded	6	3	
Maintenance	Enflurane, O <sub>2</sub> , N <sub>2</sub> O	137	87	
	Halothane, O <sub>2</sub> , N <sub>2</sub> O	10	6	
	Isoflurane, O <sub>2</sub> , N <sub>2</sub> O	6	4	
	Propofol	1		
	None	1		
	Not recorded	2		
Muscle relaxant	Alcuronium	27	17	
	Atracurium	14	9	
	Suxamethonium	12	8	
	Vecuronium	13	8	
	Vec & Sux	1		
	None used	90	57	
	Analgesic	None	31	20
		Biers block	1	
Local		1		
Spinal		1		
Caudal		5		
Caudal & opioid		2		
NSAID		2		
Opioid & NSAID		9	6	
Local & opioid ± NSAID		3		
Opioid combinations		11	7	
Opioid only		91	58	
Alfentanil (3)				
Fentanyl (80)				
DF118 (3)				
Morphine (2)				
Papavaretum (3)				

sons for admission were extended surgery and the need for inpatient postoperative management. The commonest anaesthetic complication was dizziness or faintness.

#### Oral/maxillofacial admissions

The eight patients in this speciality were admitted principally because of postoperative bleeding or drowsiness and vomiting.

#### Anaesthetic technique

Table 6 summarizes the anaesthetic agents used. Except in two patients who received spinal or intravenous regional anaesthesia, general anaesthesia was employed in all the admissions. Premedication was given in 13% of patients. Propofol was the preferred induction agent and was used in 70% of patients. An antiemetic was given to 33% of patients either with the premedication or intraoperatively. Maintenance of anaesthesia almost invariably included a volatile agent which was usually enflurane. More than 40% of patients received a neuromuscular blocking drug. An analgesic was given in

80% of patients and over 90% of these patients received either an opioid alone or in combination with another agent.

#### Discussion

Unplanned postoperative admission is a useful measure of outcome following day surgery. This audit has revealed that the postoperative admission rate in our unit ranged from 3.9–12.9% depending on the surgical speciality, but the overall rate was 5.8%

Studies of other day surgery units have found unplanned admission rates that range from less than 1%<sup>1</sup> to 9.5%<sup>2</sup>. The rate is influenced by the type of unit and it is recognized that hospital-based units tend to have higher admission rates compared to free-standing units. When patients cannot be readily admitted into a hospital bed, strict adherence to patient selection criteria and careful choice of surgery and anaesthesia becomes obligatory to minimize the likelihood of postoperative admission.

Compared to many of the published rates, the admission rate from our day surgery unit is high. This may be the result of a number of factors. Dudley Road Hospital

serves the fourth most deprived population in UK health districts. About half of our 'social' admissions were patients who would have been alone at home on the night after surgery. Patients were not assessed by either the nursing staff or the anaesthetist to ensure their suitability as day cases prior to admission. The unit is hospital-based and on the day of operation, given the relative ease of postoperative admission, patients considered inappropriate for day surgery were seldom postponed or reallocated to inpatient surgery.

Apart from a separate day ward where they receive preoperative and postoperative care, the patients in our unit are treated in the same operating session as the inpatients. This may have tended to blur the distinction between the two types of patient so that surgical management was not constrained necessarily by the need to discharge the patient later in the day; diagnostic procedures could proceed to definitive surgery which might entail a period of inpatient postoperative management.

The day surgery ward had to close by 18.00 h and this limited the time available for postoperative recovery, particularly after operations performed in the afternoon. If it was anticipated that the patient might not be ready to return home by 18.00 h a decision had to be made earlier so that a bed could be located for the patient to stay in hospital overnight. As a result a number of patients ('late finish') were admitted because it was considered too late in the day to discharge them.

Since this audit patients proposed for day case surgery at the outpatient clinic are first assessed by nursing staff and, when necessary by an anaesthetist, before they are listed for surgery. The day ward hours have been extended and these changes should ensure that fewer patients will require postoperative admission.

In common with the findings of other investigators<sup>3,4</sup>, we found high admission rates following orthopaedic and gynaecology procedures. In our unit, orthopaedic surgery resulted in the highest admission rate (12.9%), the large majority of these admissions had undergone diagnostic arthroscopy – a procedure which often led to further surgery, requiring admission for postoperative inpatient management. Laparoscopic gynaecological procedures predisposed to the development of postoperative anaesthetic complications, especially nausea and vomiting.

Overall, the three commonest reasons compelling postoperative admission were related to anaesthesia. This is in contrast to the findings in most of the published studies, where surgery-related complications were the principal reason for admission. However, gynaecology patients accounted for the largest group of admissions in our unit and the commonest reason for postoperative admission in these patients, as in a survey of day case gynaecological surgery<sup>5</sup>, was nausea and vomiting. We also regarded postoperative pain requiring management in hospital as an anaesthetic complication, whereas most other studies consider this to be a surgery-related problem.

It may be possible to reduce some of the anaesthetic causes of unplanned admissions following day surgery

by a change in anaesthetic technique. Johnson and Jarrett<sup>1</sup> noted that admissions for anaesthetic reasons decreased after the introduction of propofol. Kortilla and colleagues<sup>6</sup> found that patients who were given propofol for induction and maintenance of anaesthesia had less nausea and vomiting and were ready for discharge home sooner than control patients who received thiopentone for induction and isoflurane for maintenance. Twenty-seven per cent of admissions in our unit received thiopentone. Would the exclusive use of propofol for day surgery lead to a reduction in anaesthesia-related admissions?

Although 13% of the patients admitted received a premedicant drug (temazepam in all cases), only two of these patients were admitted because of drowsiness.

The second commonest cause of admission was due to nausea and/or vomiting. As 66% of these admissions did not receive any antiemetic, it is tempting to speculate that the use of a prophylactic antiemetic in these patients could have reduced these admissions. Many of the antiemetics in current use, however, are either ineffective<sup>3,7</sup> or may have unacceptable side effects. The new 5-hydroxytryptamine-3 antagonists have shown promise in the prevention of nausea and vomiting during cancer chemotherapy, and their use in day case anaesthesia should be explored.

The use of opioid analgesics, in particular fentanyl, was common in our patients. However, this practice would almost certainly predispose to nausea and vomiting. We feel that there is more scope for increased use of non-steroidal anti-inflammatory drugs (NSAIDs) in day case surgery. There is some evidence that the use of NSAIDs before body surface surgery may provide better postoperative pain relief without the concomitant side effects seen with opioid drugs<sup>8</sup>.

Caudal analgesia led to four admissions because of postoperative urinary retention – a well recognized side effect. Further studies are required to clarify the place of caudal analgesic techniques in day surgery.

In agreement with most other studies, our main surgical reasons compelling admission were extended surgery and the need for inpatient management. This reflects the nature of some of the commonly performed day case procedures (cystoscopy, arthroscopy and laparoscopy) which may entail further surgery.

This study has demonstrated that many different factors contribute towards unplanned admission following day case surgery. Changes have already been implemented in the organization of the day surgery unit and plans are in place to establish dedicated day case operating lists early in 1994. If a 'best anaesthetic technique' for day surgery could be identified and adopted, then this would surely lead to a reduction in anaesthesia-related complications.

Successful day case surgery relies on careful patient selection, the appropriate choice of surgery and good anaesthetic management – requirements which will increasingly be challenged with the trend towards performing more day surgery, including more ambitious procedures, and on less fit patients.

### Acknowledgements

We would like to thank Judith Pepper and Sue Marwa from the Audit Department and Sister Mary Barnes of the Day Surgery Unit, Dudley Road Hospital.

### References

- 1 Johnson CD, Jarrett PEM. Admission to hospital after day case surgery. *Ann Roy Coll Surg Engl* 1990; **72**: 225-8
- 2 Levin P, Stanziola A, Hand R. Post-operative hospital retention following ambulatory surgery in a hospital based program. *Am Coll Utilization Rev Phys* 1990; **5**,3: 90-4
- 3 Thompson EM, Mathews HML, McAuley DM. Problems in day care surgery. *Ulster Med J* 1990; **60**(2): 176-82
- 4 Biswas TK, Leary C. Postoperative hospital admission from a day surgery unit: A seven year retrospective survey. *Anaesth Intens Care* 1992; **20**: 147-50
- 5 Meeks GR, Waller GA, Meydrech EF, Flautt FH Jr. Unscheduled hospital admission following ambulatory gynecologic surgery. *Obst & Gyn* 1992; **3**(1): 446-50
- 6 Kortilla K, Ostman, P, Faure E et al. Recovery from propofol versus thiopental-isoflurane in patients undergoing outpatient anesthesia. *Acta Anaesthesiol Scand* 1990; **34**: 400-3
- 7 Cohen SE, Woods WA, Wyner J. Antiemetic efficacy of droperidol and metoclopramide. *Anesthesiol* 1984; **60**: 67-9
- 8 Campbell WI. Analgesic side effects and minor surgery. Which analgesic for minor and day case surgery? *Br J Anaesth* 1990; **64**: 617-20

## 1994 ASPAN

### AMERICAN SOCIETY OF POST ANESTHESIA NURSES

### 13TH NATIONAL CONFERENCE

APRIL 24-28

### CHICAGO HILTON & TOWERS, CHICAGO, ILLINOIS

The American Society of Post Anesthesia Nurses (ASPAN) was founded in 1980. The Association currently has approximately 9,300 members. The purpose of the ASPAN National Conference is to advance knowledge within the areas of its goals and Constitution through its education program, its communication, and resource information.

There will be an extensive medical exhibition that will enable attendees to see, hear, and examine the latest developments in equipment, supplies, literature and services.

For further information, please contact: Chicago Hilton & Towers, 720 South Michigan Avenue, Chicago, IL 60605, USA. Tel: 312 922 4400. Fax: 312 431 6904.