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Twelve years' local experience in ambulatory anaesthesia

本港應用非住院式麻醉技術的十二年經驗

Objectives. To determine the incidence of adverse events after ambulatory anaesthesia (postoperative nausea and vomiting, postoperative pain, difficulty in movement), and to evaluate the level of satisfaction of patients with our service.
Design. Retrospective study with questionnaire survey.
Setting. Tertiary referral centre, Hong Kong.
Participants. All patients whose duly completed questionnaires were available.
Main outcome measures. Incidence of adverse events and level of patient satisfaction.
Results. A total of 9197 patients underwent surgery under general anaesthesia or neuraxial blockade by anaesthetists in ambulatory settings from October 1993 to December 2005: questionnaires filled out by 8231 of these patients were analysed, whereas 549 questionnaires were lost, and 417 patients could not be contacted. The response rate was 90%; 59% of the respondents were males, 50% were younger than 15 years and 5% older than 60 years. Fifty-one percent of surgery with anaesthetists' involvement was performed under general anaesthesia and 48.9% under general anaesthesia and regional blocks and 0.1% under neuraxial blockade. There were 3.3% of patients experienced postoperative nausea and vomiting, 60.2% experienced episodes of pain between the time of discharge and the time of interview, and 46% required analgesics. Nonetheless, 80% resumed normal activities within 5 hours after anaesthesia and 97.5% resumed normal diet the following morning. Over 99% rated our service as good or excellent.
Conclusion. Although ambulatory anaesthesia was associated with minor adverse events, patients could resume normal diet and daily activities quickly and were satisfied with the service.

目的：確定非住院式麻醉後出現的副作用（術後噁心嘔吐、術後痛楚、活動不便），並評估病人對服務的滿意程度。
設計：以問卷作回顧性研究。
安排：第三層醫療轉介中心，香港。
參與者：所有能取回完成問卷的病人。
主要結果測量：副作用的發生和病人的滿意程度。
結果：1993年10月至2005年12月，有9197名病人由麻醉醫生以全身麻醉方法或神經封鎖方法，麻醉後進行手術。他們之中有8231人完成問卷可作分析；另有549名病人的問卷遺失，417名病人失去聯絡。問卷回覆率為90%，其中59%的病人為男性，50%病人為15歲以下的兒童，5%病人則超過60歲。51%的手術是用全身麻醉方式進行，48.9%以全身加局部麻醉方式進行，有0.1%的手術是以神經封鎖的方法麻醉。有3.3%病人手術後出現噁心嘔吐，60.2%病人在出院至受訪期間出現階段性痛楚，有46%病人需要使用止痛藥。然而，有80%病人在麻醉後5小時內已恢復正常活動能力，97.5%病人在次日早上已可正常進食。超過99%病人對服務評級為良好或優秀。
結論：雖然非住院方式的麻醉與輕微的副作用有關，病人仍可快速回復正常進食和活動能力，並對服務感到滿意。

Key words:
Ambulatory care;
Ambulatory surgical procedures;
Anesthesia;
Postoperative nausea and vomiting

關鍵詞：
非住院醫療；
非住院手術程序；
麻醉；
術後噁心嘔吐

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Introduction

The ambulatory anaesthesia service in Queen Elizabeth Hospital started in October 1993. Initially, patients were admitted to wards under the care of corresponding specialties. Surgical procedures were performed in the main

operating theatres as in-patient procedures. In 1997, the Day Surgery Unit was moved to the Ambulatory Care Centre, a separate building block from the main hospital complex. The centre is comprised of a pre-admission clinic, an area where patients may wait/rest before and after surgery and prior to discharge, three operating theatres, and a postanaesthetic care room. A team of nursing staff experienced in ambulatory surgery runs it.

A total of 9197 patients underwent surgery with the involvement of the ambulatory anaesthesia service, during the period 1993 to 2005. In the ambulatory centre, the number of half-day sessions for general anaesthesia increased gradually from 239 in 1998 to 287 in 2005. A total of 404 of the patients availing themselves of ambulatory anaesthesia were admitted to hospital after their surgery; the rate of unplanned admission was therefore 4.4%. Among these, 140 admissions were related to anaesthetic problems, three were for airway problems, and the remainder were related to postoperative nausea and vomiting (PONV), dizziness, pain at surgical sites, and lower limb weakness after regional anaesthesia.

Anaesthetists assessed the patients in the pre-admission clinic, about 2 to 4 weeks before the scheduled date of operation. Appropriate investigations were ordered and reviewed, and if indicated other specialties were consulted. Preoperative instructions (including those related to the necessary fasting period) and preoperative medications were given to the patients. The process was streamlined to ensure that the patient's condition was optimised before the operation.

On the day of surgery, patients came to the Day Surgery Unit in the morning. Anaesthetists and surgeons reassessed the patients for any contra-indications to their operation, such as upper respiratory tract infection. After surgery, patients were closely monitored in the post-anaesthetic care room where pulse oximetry, electrocardiography, and non-invasive blood pressure monitoring were applied. If the patients' conditions were stable, they were discharged to the waiting area. The nursing staff then encouraged the patients to resume feeding and begin walking exercises under observation. In the afternoon, patients were assessed by the anaesthetists and surgeons and subsequently discharged home. Post-operative instructions (including advice on how to care for the wound) were given.

The next morning, the nursing staff routinely attempted to contact the patients (or the responsible guardians for paediatric patients) via the telephone. Those who could not be contacted, would be telephoned again on the next day. When the relevant individual was contacted, a standardised questionnaire (Appendix) was used to assess the well being of each patient and evaluate the level of satisfaction with the service. Patients who had surgery under local anaesthesia were discharged on the same day and follow-up at an out-patient clinic was arranged. However, the latter patients were not contacted on the next day, nor were they asked to respond to the questionnaire. Based on data collected from the questionnaires, we aimed to evaluate the incidence of postoperative complications among patients receiving general anaesthesia and the level of satisfaction with our service.

Methods

With the approval of the Ethics Committee, patients' particulars, date and type of surgical procedures performed, mode of anaesthesia, and the questionnaires were retrieved. Each questionnaire comprised 13 questions: the first five focused on postoperative adverse events, the remaining eight addressed other aspects of our service.

To evaluate the level of satisfaction, a Quality Score (QS) was devised. The fewer the postoperative adverse events experienced, and the more positive the responses to questions 7 to 11, the higher the score. Either zero or one point was assigned to responses to these questions, except questions 6, 12, and 13 (Appendix). The sum of the points yielded the QS. Thus, the higher the QS, the higher the level of patient satisfaction with our service.

Data were analysed using the Statistical Package for the Social Sciences (Windows version 12.0; SPSS Inc., Chicago [IL], US). Parametric data were presented in frequency tables. Student's *t* test was used to compare recovery times in 1996 and 2005. A P value of <0.05 was considered significant. Pearson correlation coefficients were calculated for different factors.

Results

From October 1993 to December 2005 inclusive, 9197 patients had surgery under ambulatory anaesthesia (general anaesthesia and/or neuraxial blockade). A total of 549 questionnaires were lost, hence 8648 questionnaires pertaining to the latter were available. Patients' age and sex, type of surgery, and mode of anaesthesia were available for analysis. Of the 8648 questionnaires, 417 were marked "patient could not be contacted", and so 8231 were used for analysis of the responses to questions 1 to 13.

The patients whose questionnaires were analysed comprised 5141 (59%) males, 4365 (50%) were younger than age 15 years, and 407 (5%) were older than 60 years. The proportion of patients aged over 60 years increased from 1.8% (12/667) in 1997 to 7.5% (73/973) in 2005. Table 1 shows the list of surgical procedures performed during the 12 years and actual numbers of each procedure in 1996, 2000, and 2005. The caseload under different specialties is summarised in Fig 1. The number of new procedures such as laparoscopic gynaecological surgery and knee arthroscopy has increased: 15 patients had such gynaecological procedures in 2003 compared to 46 in 2005.

Table 1. Number of procedures performed in 1996, 2000, and 2005 and the incidence of postoperative morbidity during 12 years

Specialty/procedures*	No. of patients			No. of patients in 12 years†				
	1996	2000	2005	Q1	Q2	Q3	Q4	Q5
Gynaecology								
Hysteroscopy/D&C	21	143	181	34 (2.4%)	37 (2.6%)	219 (15.6%)	40 (2.8%)	21 (1.5%)
LEEP +/- cone biopsy	3	0	17	0	0	7 (33.3%)	1 (4.8%)	0
Laparoscopic surgery	0	1	46	6 (7.1%)	1 (1.2%)	56 (71.4%)	45 (53.6%)	4 (4.8%)
Miscellaneous	5	3	16	0	2 (2.6%)	33 (42.3%)	20 (25.6%)	5 (6.5%)
Surgical								
Hernia (inguinal/umbilical)	52	95	122	37 (3.7%)	26 (2.6%)	781 (77.7%)	652 (64.9%)	73 (7.3%)
Circumcision	320	246	210	92 (3.2%)	50 (1.8%)	2096 (73.5%)	1711 (60.0%)	84 (3.0%)
High ligation/orchidopexy	11	12	15	3 (2.2%)	2 (1.5%)	88 (64.7%)	68 (50.0%)	4 (2.9%)
Combined (hernia/ circumcision/high ligation)	5	7	6	4 (4.4%)	3 (3.4%)	77 (85.6%)	62 (68.9%)	7 (2.9%)
Breast lesion surgery	0	58	89	31 (5.2%)	16 (2.7%)	396 (66.7%)	255 (43.1%)	17 (2.9%)
Varicose vein surgery	0	8	16	2 (3.1%)	2 (3.1%)	51 (78.5%)	38 (58.5%)	12 (18.5%)
Laparoscopic cholecystectomy	0	9	4	7 (9.2%)	5 (6.6%)	70 (92.1%)	48 (63.2%)	2 (2.6%)
Urological (TURBT/ Jaboulay's)	0	1	5	0	2 (8.3%)	15 (62.5%)	8 (33.3%)	0
Miscellaneous/excision	32	176	183	44 (3.2%)	49 (3.6%)	831 (60.6%)	642 (46.9%)	56 (4.1%)
Orthopaedics								
Release of trigger finger	17	10	12	1 (0.8%)	3 (2.4%)	43 (33.6%)	34 (26.6%)	1 (0.8%)
Arthroscopic surgery	1	1	28	1 (1.9%)	0	38 (73.1%)	26 (50.0%)	7 (13.5%)
Removal of prosthesis/ miscellaneous	6	30	18	12 (4.8%)	4 (1.6%)	144 (58.3%)	113 (45.7%)	29 (11.9%)
Total	473	800	968	274 (3.3%)	202 (2.5%)	4949 (60.2%)	3763 (45.8%)	322 (3.9%)

* D&C denotes dilatation and curettage, LEEP loop electro-excision procedure, and TURBT trans-urethral retrograde resection of bladder tumour
† Q1 denotes postoperative nausea and vomiting, Q2 not resuming a normal diet, Q3 postoperative pain, Q4 'requiring' postoperative analgesics, Q5 experiencing difficulty in moving. The % in brackets represents the proportion of patients having the specified procedures with the corresponding symptom

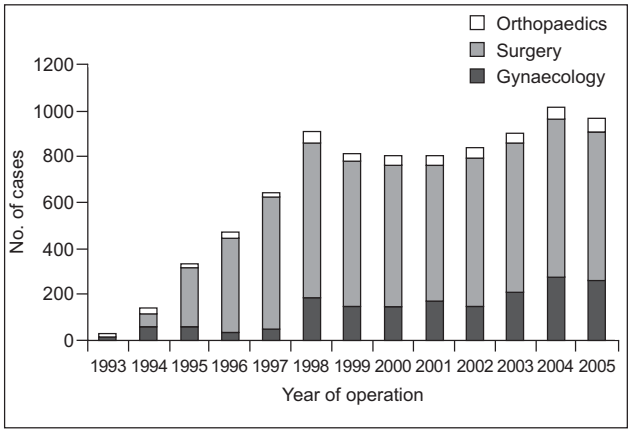

Fig 1. Caseload under different specialties, 1993-2005

Patients having knee arthroscopic surgery increased from two in 2003 to 28 in 2005.

In all 4407 (51%) of these 8648 patients whose questionnaires were available had surgery under general anaesthesia; 4229 (48.9%) involved general anaesthesia and regional blocks, such as penile block for circumcision and ilioinguinal block for herniotomy, and 11 (0.1%) were performed under neuraxial (spinal) anaesthesia.

Regarding responses to the questionnaire (all obtained on the following morning), percentages were based on the total number of responses to individual questions, due to missing data for some questions. Thus, PONV was indicated in 3.3% of the responses and was procedure dependent; the incidence varied from 2.4% for hysteroscopy, or dilatation and curettage to 7.1% for gynaecological laparoscopic surgery, and 9.2% for laparoscopic cholecystectomy. There were no significant correlations between the incidence of PONV and (i) age (r= –0.015, P=0.172, n=8220), (ii) sex (r= –0.025, P=0.024, n=8222), (iii) mode of anaesthesia (r= –0.004, P=0.690, n=8222), (iv) postoperative pain (r=0.056, P<0.01, n=8218), and (v) year of operation (r=0.005, P=0.680, n=8222). At the time of interview, 97.5% of patients had resumed normal diet and 60.2% admitted to experiencing episodes of postoperative pain after discharge. The incidence of pain episodes was high for some procedures (92% for laparoscopic cholecystectomy, 78% for Trendelenburg operation for varicose vein, 78% for hernia repair). In all 3.9% of these patients complained of difficulty in movement, a higher incidence was associated with Trendelenburg operations for varicose vein (18.5%) and knee arthroscopic surgery (13.5%).

Regarding the time taken to resume normal activities, no standardised questions were posed between 1993 and 1995. Of 486 patients who underwent surgery during these 3 years, 29 reported resuming normal activities in the afternoon of the day of operation, 352 in the evening, and 105 on the next morning. These data were not entered for analysis. From 1996 onwards, patients were asked specifically when they could resume daily activities in terms of hours after anaesthesia and analysis of these data revealed that about 80% could resume normal routine

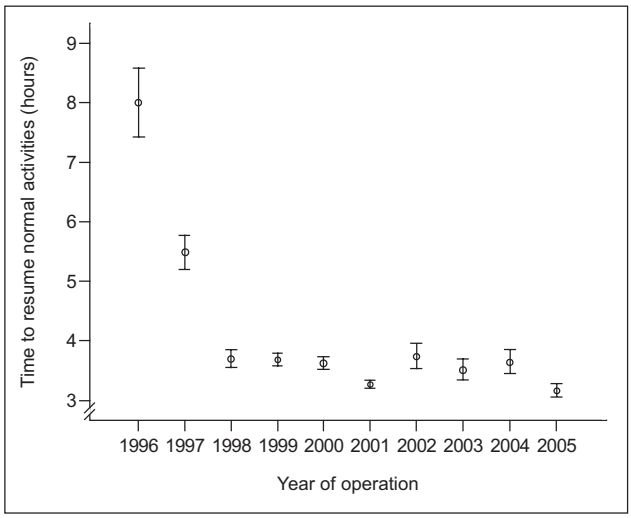

Fig 2. Time to resume normal activities after anaesthesia and surgery
Mean value represented by the circle with 95% confidence interval included

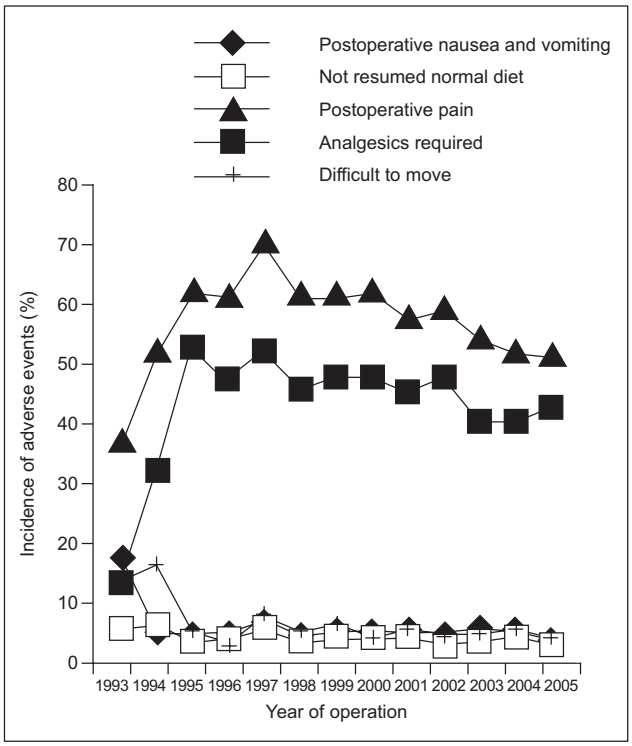

Fig 3. Relative incidences of various adverse events

activities within 5 hours of their surgery. A significant shortening of recovery time across the years was noted. The mean recovery times (Fig 2) were 8 hours in 1996 and 3.2 hours in 2005 ($P<0.05$). The incidences of various postoperative adverse events are summarised in Fig 3.

Over 99% of patients indicated that preoperative and postoperative instructions were adequately given. About 99% commented that day surgery was a good option and 98% would consider having future operations in a Day Surgery Unit. The level of satisfaction with our service was rated as good by 70% and excellent by 29%. Only 0.1% contacted the unit with enquiries post-discharge. Responses to questions 7 to 13 are summarised in Table 2. The level of satisfaction as determined by the QS is shown in Fig 4.

Discussion

Ambulatory anaesthesia reduces hospital admission and minimises the risk of nosocomial infection. It also minimises hospital stay and results in less disturbance to patients' daily routines. This is especially important for paediatric and elderly patients. A dedicated Day Surgery Unit away from the main complex of the hospital is therefore preferred.

With development of new surgical techniques, procedures that in the past required postoperative care in hospital can now be performed in ambulatory settings. Such procedures include laparoscopic sterilisation, cholecystectomy, and knee arthroscopic surgery. Thus, the scope of ambulatory surgery and anaesthesia is expanding. The number of procedures performed under general anaesthesia with or without regional blocks increased from 137 in 1994 to 968 in 2005. The number of less-invasive procedures, such as arthroscopic surgery and gynaecological laparoscopic surgery also increased.

Ambulatory anaesthesia is associated with very low rates of major morbidity, and deaths are extremely rare. In one series, of 38 598 patients who underwent ambulatory surgery, only four deaths were reported within the next 30 days; two were due to myocardial infarction and two followed road traffic accidents.[1] Another study reported no fatality among 13 433 patients having ambulatory surgery; only 106 patients had mainly surgical complications within 2 weeks of their operation.[2]

Prevention or reduction of postoperative morbidity is important for patients as well as the quality assurance of the service. Postoperative nausea and vomiting is a frequent adverse event associated with ambulatory anaesthesia. It is one of the main reasons for prolonged postoperative stay and unanticipated hospital admission.[3] Its aetiology is multifactorial, which may explain the variable incidence reported in the literature. In our study, 3.3% of patients experienced PONV compared to 17% with nausea and 8% with vomiting reported in one systematic review.[4] One of the risk factors is the type of surgical procedure performed; laparoscopic cholecystectomy and gynaecological laparoscopic surgery are associated with a higher incidence of PONV,[5] varying from 30 to 60% (median, 50%). As these types of surgical procedures are being performed increasingly, prevention and treatment of PONV becomes even more important. Prophylactic use of anti-emetics may be indicated in this group of patients. Other risk factors

Table 2. Summary of responses to questions 7 to 13

Questions	Yes	No	No response
Q7. Was preoperative instruction adequate?	8156 (99.4%)	51 (0.6%)	441
Q8. Was postoperative instruction adequate?	8159 (99.5%)	45 (0.5%)	444
Q9. Could you follow postoperative instructions?	7875 (96.0%)	329 (3.8%)	444
Q10. Was day surgery a good option for you?	8127 (99.1%)	73 (0.9%)	448
Q11. Would you opt for day surgery in future?	8039 (98.5%)	126 (1.5%)	483
Q12. How would you rate your level of satisfaction?			
Excellent	2394 (29.4%)		
Good	5742 (70.4%)		
Fair	18 (0.2%)		
Poor	0		
Missing	494		
Q13. Did you call back the unit for any enquiry after discharge?*	6 (0.1%)	6886 (99.9%)	1756

* Question 13 was added since 1997

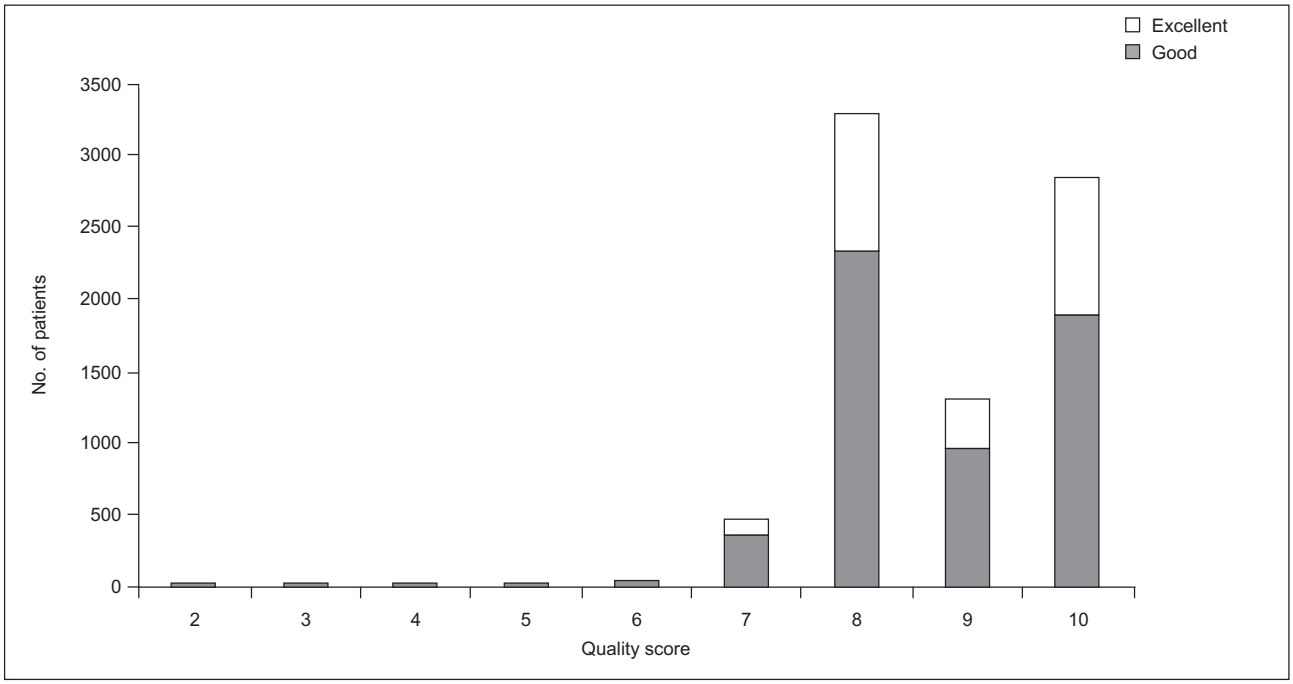

Fig 4. Level of satisfaction against Quality Score

reportedly associated with PONV (female sex, younger age, a history of motion sickness, and a history of PONV),[6] were not evident in our study.

Postoperative pain is another main adverse event associated with longer postoperative stay and higher incidence of unplanned admission.[3,7] Among our 8231 patients, 58% experienced episodes of pain in the period intervening between discharge and interview, which is comparable to an incidence of 40 to 70% in another report.[6] The incidence of pain also varies according to the surgical procedure performed. Laparoscopic cholecystectomy and combined surgical procedures are associated with higher incidence of postoperative pain; 46% of such patients received analgesics. Appropriate pain management is important in the success of ambulatory anaesthesia, since it reduces stress to patients and enhances their ability to resume normal daily activities. It is suggested that simultaneous use of local anaesthetics, non-steroidal anti-inflammatory agents, and opioids is an effective means of providing pain control without inducing PONV in patients and facilitates their early discharge.[8]

A significant reduction in the time for patients to resume normal activities was noted over the years. Treatment with propofol (a relatively new anaesthetic agent) rather than thiopentone (a barbiturate) may have contributed to the shorter recovery times.[9] Propofol was already in use when our ambulatory anaesthesia service started; therefore the underlying cause for this phenomenon is yet to be elucidated. Detailed examination of our patients' anaesthetic records may provide some insights.

Patient acceptance of ambulatory anaesthesia and satisfaction with the service have been identified as important markers of outcome.[10] Although 99.8% of our

patients rated our service as excellent or good, there was no relationship between the QS and the level of satisfaction (question 12). In the literature, cross-sectional surveys using different formats have yielded uniformly high scores for satisfaction with the service provided (>80% of patients satisfied or very satisfied).[11-14] Whether patients are truly satisfied with our service and whether other factors (not included in our questionnaire) might be more important to patients requires further clarification.

Limitations to the current study are that it was retrospective and the analysis depended on self-reported data from a questionnaire. The questionnaire was administered by different nurses, over a period of 12 years and therefore subject to inter-observer variation. The questionnaire was designed at the start of the ambulatory anaesthesia service with the aim of evaluating patient well-being after surgery and their level of satisfaction with the service. It also aimed to be concise, to enable completion in a short period. Thus, factors or aspects of our service which patients considered important might easily have been missed. The current questionnaire was modified and open questions introduced to allow patients to express their opinion. The response rate in the current study was nearly 90%. We believed that the reported incidence of individual adverse events could be used as a reference for future study and improvement.

In conclusion, our experience shows that ambulatory anaesthesia is associated with minor morbidity. Patients were satisfied with our service and could resume their daily activities quickly.

Acknowledgements

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Appendix. Modified Patient Satisfaction Questionnaire for Day Surgery Patient, Queen Elizabeth Hospital

Age of patient:_____ Sex of patient:_____

Nature of operation:_____

Date of operation:_____

Type of anaesthesia:_____

Questions	Yes*	No*
1. Have you experienced any nausea or vomiting?	0	1
2. Have you commenced eating a normal diet today?	1	0
3. Have you experienced any postoperative pain?	0	1
4. Did you require any analgesia? What sort? _____	0	1
5. Have you experienced any difficulty in moving about?	0	1
6. How soon after the anaesthetic did you return to your normal daily routine and activities?		
7. Do you think the instructions given to you prior to surgery adequate?	1	0
8. Do you feel you have been given adequate postoperative instructions?	1	0
9. Have you followed your postoperative instructions?	1	0
10. Did you find Day Surgery a good way to have your operation?	1	0
11. If possible, would you have any future operation as a Day patient?	1	0
12. How would you rate your overall surgery experience in our hospital? ( ) excellent, ( ) good, ( ) fair, ( ) poor		
13. Did you call back for enquiry after discharge to 8am next morning?		

* Either zero or one is given to the responses to the questions except questions 6, 12, and 13. The sum of the points yields the Quality Score (QS). Question 13 was added since 1997