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Editorial

Decision making partners: cost and outcome

The practice of ambulatory surgery was documented in 1909 by J. H. Nicoll of Glasgow (Scotland). He informed the British Medical Association of 8988 operations that had been performed on day surgery patients between the years 1899 and 1909 at the Glasgow Hospital for Sick Children.[1] Surgical outcomes were equally successful for day-surgery and hospitalized patients. Nicolls said, "The treatment of a large number of the cases at present treated indoor constitute a waste of the resources... we keep similar cases in adults too long in bed". He based his report on patient outcome; although he referred to "a waste of the resources", cost at that time was not a factor.

In 1916, Ralph Waters opened a Down-Town Anesthesia Clinic in Sioux City, Iowa (USA) for dental cases and minor surgery. Waters reported, "As to the satisfaction of my patients, I think I can say this: There are none who have found fault with our work... nor fail to tell their friends about it".[2] Patient satisfaction influenced his decisions; cost at that time was not a factor.

The Phoenix Surgicenter, a freestanding ambulatory surgical facility, opened its doors in 1970 in Phoenix, Arizona (USA). A plaque in its lobby proclaimed , "Dedicated to the principle that high-quality outpatient surgical care can be provided in a caring, personal environment, in a freestanding ambulatory facility at a lower cost than other alternatives". The message of Nicoll and Waters had been heard; cost is now considered a factor.

The last 20 years has been a time of remarkable change in clinical medicine, but no aspect has proved to have a more profound influence on the delivery of healthcare than the development of ambulatory surgery. Physicians and patients have come to realize that hospitalization is not the only method of providing quality care; day-surgery has proved itself to be cost-effective, safe and convenient to the patient, the patient's family and the physician.

Today, largely because of a thrust towards cost containment, ambulatory surgery has been substituted for more traditional hospital surgery in ever-increasing numbers. By the end of this decade, it is expected that over 70% of all elective procedures in the USA will be performed on an ambulatory surgical basis. Similar patterns are expected throughout many other areas of the world.

Whereas originally ambulatory surgery meant short procedures on healthy patients, we are currently seeing more patients with significant health problems, more geriatric patients, and with the improvement of surgical techniques and instrumentation, a continually expanding list of acceptable procedures. Now that ambulatory surgery has matured with some little changes and fine tuning, it is necessary and desirable that emphasis on the medical aspect of ambulatory surgery replaces emphasis on more technical and administrative matters that have characterized this specialized area during its initial growth phase.

In the 21st century we will face increasing pressure from government, industry and healthcare payors to perform more significant ambulatory surgical procedures on patients who have a health problem. Because of past successes, we must not allow ourselves to be lulled into a state of complacency. Cost cannot be the only driving force in our decision-making process. We must continually reassess patient and procedure selection, appropriate laboratory and diagnostic testing and safe discharge criteria. Every day-surgery facility must gather outcome data and develop an action plan based upon documented results.

Clearly, cost containment is becoming the order of the day. We are challenged by and will be continually challenged to merge excellence of care with low cost. Extrinsic pressures must never cause us to lose sight of the fact that ambulatory surgery patients have special needs and present special challenges. There is a panorama of vital issues in

ambulatory surgery that need to be addressed continually, including preoperative evaluation, selection of anesthesia drugs and techniques, appropriate surgical procedures, pain management, postanesthesia care challenges and a large number of administrative demands. We must have outcome data that will allow appropriate decisions to be made.

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Review

Total intravenous anaesthesia in day case surgery

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The use of total intravenous anaesthesia (TIVA) has increased in the UK over the past few years, and in some units 30% of anaesthetics are administered this way[1]. The true value of any anaesthetic technique should be evaluated by examining the various advantages or disadvantages in terms of cost, pharmacological profile and ease of use of the technique in everyday practice. Table 1 lists the agents currently available for TIVA in a day case setting and this review will compare these agents with one another, in addition to making a direct comparison with the volatile anaesthetic agents. Finally, the recovery profile of these agents will be considered and an overview of the advantages and disadvantages of TIVA will then be formulated.

Intravenous anaesthetic agents – induction, maintenance and recovery aspects

Day case anaesthesia primarily concerns the recovery of patients to street fitness, and it should be the goal of anaesthetists to provide quality recovery. The recovery aspects of the commonly used induction agents will be compared, before examining their role in the maintenance of anaesthesia. Other important factors such as premedication and analgesic regimes may also have a significant effect on recovery and perioperative complications.

Intravenous induction agents

In the UK propofol is the most popular day case anaesthetic induction agent, but the place of other agents such as thiopentone, methohexitone, and etomidate should be considered. Few studies have compared these agents with ketamine in a day unit setting. Comparison of induction half-lives may tempt anaesthetists to draw conclusions concerning recovery performance, but because a large proportion of the induction action of these agents is related to redistribution and not to metabolism, this may not be an easy comparison to make.

When propofol is compared to other induction agents for short operative procedures there is, indeed, evidence that there is no delay in recovery or alteration in postoperative co-ordination[2]. One series has shown that discharge time was unrelated to the induction agent used, including results with thiopentone[3]. However psychomotor impairment may occur for up to 5 h following thiopentone compared with 1 h with propofol[4,5]. This is supported by further work claiming a significant difference in sitting up and street fitness times, together with a reduced incidence of postoperative nausea and vomiting (PONV) in the propofol group[6]. Furthermore propofol compares favourably with methohexitone, again producing a faster recovery profile, although at 4 h no differences between thiopentone, methohexitone or propofol were observed[7]. It has also been recorded that propofol patients may display a better sense of wellbeing compared to other agents, but whether this is attributable directly to the agent itself or to the lack of PONV or barbiturate 'hangover' remains unclear[8].

When propofol was compared to thiopentone in children it was noted that in children under 5 yr only the

Table 1. Agents suitable for total intravenous anaesthesia (with half-lives)

Propofol	3–4.8 h
Methohexitone	4 h
Thiopentone	11.5 h
Etomidate	75 min
Ketamine	2.5 h

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time to spontaneous eye opening was shorter after propofol. However in children aged 5–11 yr, times of spontaneous eye opening, name giving and discharge were shorter after propofol induction. These results showed that propofol hastened early recovery in children undergoing day case surgery, but earlier discharge occurred only in older children[9].

Intravenous agents for maintenance

The recovery aspects of intravenous agents when used for anaesthesia or sedation will now be examined. Various studies have looked at intravenous agents in comparison with each other, but perhaps the most interesting topical debate arises when the recovery aspects of intravenous anaesthetic agents are compared to their volatile anaesthetic counterparts.

When propofol, methohexitone and midazolam were compared to propofol for sedation, the vigilance and concentration of the subjects were worse in the midazolam and methohexitone groups[10]. There is, however, evidence that premedication with midazolam before sedation with propofol may increase anxiolysis and sedation without affecting discharge from the recovery room[11]. Indeed the use of midazolam premedication before general anaesthesia does not appear to alter the patients' ability to reach street fitness times in the day surgery environment[12].

When propofol and thiopentone were compared as maintenance agents for brief surgical procedures, the recovery in both memory and psychomotor performance was superior in the propofol group. The subjective feelings of tiredness, drowsiness and alertness were significantly worse in the thiopentone group even at 24 h[13]. This is not surprising owing to the different pharmacology of these agents and the known potential for accumulation with thiopentone.

Methohexitone, etomidate and althesin have been studied in day surgery, and it was found that recovery from methohexitone appeared to be the fastest. It was interesting to note that in this study it was found to be too difficult to produce good operating conditions with etomidate and this agent yielded the highest complication rate[14]. Finally, a series comparing propofol and methohexitone for outpatient anaesthesia found that propofol produced fewer side effects, e.g. hiccough and PONV, and the recovery times for awakening and ambulation were shorter in the propofol group[15].

Throughout the literature review the common theme when comparing the intravenous agents against one another for maintenance in day surgery was not a question of recovery. Etomidate has important side-effects such as a 30% PONV rate, a high incidence of pain on injection with venous sequelae, a potent suppression of cortisol synthesis and difficulty in producing good operating conditions. Ketamine may be associated with postoperative hallucinations and emergence phenomena, and methohexitone has a high incidence of airway complications. Thiopentone, used for induction, may produce similar discharge times to propofol but barbiturate 'hangover' effects still remain. It would appear that propofol provides a superior recovery profile as shown by psychomotor tests, but although discharge times are similar, perhaps a better recovery quality tilts the balance towards the use of propofol.

A comparison of induction agents against one another indicated that the incidence of side-effects and complications perioperatively was lower when propofol was used. This ought to be an important consideration for all anaesthetists discharging day cases early into the community.

Recovery aspects of TIVA compared to volatile anaesthetic maintenance

The important question in day case anaesthesia today is whether to advise the use of TIVA with propofol, or the continued use of established or newer volatile anaesthetic agents. Interestingly, when propofol TIVA is compared to an anaesthetic comprising thiopentone or halothane induction coupled with halothane maintenance in children, the TIVA group produced the slowest recovery and there was no difference in recovery if thiopentone was used for induction compared to halothane[16]. However, when TIVA recovery was compared to an enflurane anaesthetic, the immediate recovery was shorter in the propofol group if thiopentone was used for induction. There would again appear to be an increase in wellbeing noted in the TIVA group, but the time to reach discharge criteria was often the same in both groups (except in Miller[17]). In these series there was an increased incidence of PONV in the enflurane group[18].

When propofol TIVA was compared to isoflurane maintenance, conflicting papers revealed only minor differences in psychomotor test results at up to 1 hr[19–22]. Following minor gynaecological surgery there were no psychometric test differences after 60 min or fit-for-discharge times. Again a higher incidence of PONV was noted in the isoflurane groups. If isoflurane is used to supplement TIVA immediate recovery was slower and the incidence of PONV was higher, although discharge times remained the same[23]. However, when propofol was used to finish major cases using isoflurane, immediate recovery tended to be faster but the incidence of PONV was still higher than with TIVA alone[24]. In a direct comparison between TIVA and isoflurane in major cases, extubation times were longer in the TIVA groups but recovery times appeared to be similar[25].

Newer agents such as sevoflurane may offer smooth inhalational characteristics and a 30% faster immediate recovery when compared to propofol. However, the incidence of PONV was higher, and in the intermediate phase of recovery awareness, confusion and co-ordination were similar[26]. Desflurane produced a high incidence of airway complications when used for an inhalational induction, but did offer rapid recovery even after exceptionally long surgery and minimal metabolism. Desflurane was faster than propofol in the early phase of recovery but by 2 h psychomotor test times were equal. Perhaps of more relevance were the equal street fitness times, but the incidence of

PONV was higher in the desflurane group (50%) compared with the propofol group (12%)[27–30].

After all the evidence produced in this review article the debate is still open as to which anaesthetic agent should be used for day case anaesthesia. Although desflurane produces the most consistent early recovery, there is little evidence to support significant variations in the time to street fitness with any particular anaesthetic technique. Indeed there was a remarkable similarity with many recovery tests at 60–120 min following the cessation of general anaesthesia. However, there is no doubt that PONV is associated with volatile anaesthesia and therefore propofol TIVA deserves to be seriously considered for maintenance, based on its production of quality recovery with minimal perioperative sequelae.

Important considerations for TIVA

So far in this review the intraoperative and recovery performances offered by propofol produces the best pharmacological profile for use in TIVA. However, other issues need to be considered, especially if propofol TIVA is to be recommended.

Pollution

One of the main advantages of TIVA is the absence of operating theatre pollution. Potential atmospheric environmental effects exist with volatile anaesthetic agents and hepatotoxicity may also occur with some agents. Nitrous oxide has been used for over a century for its analgesic and minimal alveolar concentration (MAC) sparing effects but potential hazards may arise. It may cause expansion of closed gas spaces, e.g. air in the bowel, pleural cavity or middle ear, and this may directly affect anaesthesia or surgery. Nitrous oxide disturbs vitamin B12 synthesis through inhibition of the enzyme methionine synthetase and may interface with folic acid metabolism and the production of DNA[31]; prolonged exposure over 6 h may produce a megaloblastic anaemia. In addition, a condition similar to subacute degeneration of the spinal cord has been reported in dentists and in individuals addicted to nitrous oxide. Teratogenic effects from prolonged nitrous oxide exposure have been observed in pregnant rats[32], although there is no evidence that similar effects occur in man. Nitrous oxide may therefore be harmful both to patients and staff through occupational exposure either during anaesthesia, especially paediatric anaesthesia, or during the recovery period. Perhaps if strict guidelines, as set down by the Control of Substances Hazardous to Health (COSHH), were to be vigorously enforced the continuing use of nitrous oxide may be limited.

Toxicity and repeated anaesthetic agent exposure

Although there may be a lack of hepatotoxicity associated with TIVA, doubts remain as to the safety of propofol sedation in children. Published evidence points to five deaths of children from respiratory tract infections following sedation with propofol[33]. Correspondence indicated that the lipid solvent may be implicated if propofol was given long term, and suggested that lipid given without glucose would explain acidosis, ketosis and death in small children. Propofol is unlicensed for the anaesthesia of children under 3 yr but this may be explained on the grounds of liability vs. profit margins for the manufacturer. Manufacturers will not carry out research on the use of drugs in the very young, and the older anaesthetic agents now used for infants have been licensed retrospectively. Some paediatric anaesthetists do use propofol for young children and neonates, and work with infants has shown a larger volume of distribution and increased clearance with a resultant increase in requirements[34]. As is the case with all drugs, patients may occasionally experience allergic reactions to propofol or the egg phosphatide and soya bean oil solvent. Perhaps in this section on toxicity it should be remembered that propofol TIVA is a safe method of anaesthesia for susceptible malignant hyperpyrexia patients.

Awareness and depth of anaesthesia

Awareness is a major fear among anaesthetists, and reports divide the subject into true unconsciousness, awareness with information processing but no recall and fully conscious awareness. Modern vaporisers may alarm when nearly empty, and with the increased use of vapour monitoring during anaesthesia, episodes of awareness should be avoided. With TIVA reliable venous access is vital, especially with paralysed patients, and to date there is no monitor relating plasma levels of drug to the depth of anaesthesia. Individual propofol ranges are extremely wide compared to the standard deviations surrounding the MAC_{50} and MAC_{95} (minimum alveolar concentration) of volatile gases. Experience indicates that there is more involuntary movement during surgery with TIVA, but it is easy to increase the depth of anaesthesia rapidly. Cases of awareness with TIVA[35] often relate to inexperienced use, failure of drug delivery systems, or when unexpectedly high doses are required[36]. Auditory perception may occur during adequate general anaesthesia[37] but so far some studies have found no evidence of recall with propofol[38,39]. As with any anaesthetic technique, the experience and skill of the anaesthetist is probably the most important factor in avoiding awareness. It is therefore important that all anaesthetists employing TIVA techniques should undergo suitable training.

PONV

There is increasing evidence that TIVA is associated with a decrease in PONV[40–43], although a few studies have found no difference[44]. Patient factors contribute to PONV, with adult females and children being more susceptible, especially in those patients with a past history of PONV or motion sickness. Gynaecological, eye or middle ear surgery are also known to increase the

Table 2. Properties of an 'ideal' total intravenous anaesthetic agent

1.	Rapid onset (requires high lipid solubility and un-ionized at blood pH to allow penetration of blood-brain barrier)
2.	Rapid recovery (rapid redistribution and metabolism with no accumulation)
3.	Analgesia at subanaesthetic concentrations
4.	Minimal cardiovascular and respiratory depression
5.	No emetic effects
6.	No excitatory phenomena (e.g. coughing, hiccough, involuntary movements) on induction
7.	No emergence phenomena (e.g. nightmares)
8.	No epileptiform activity
9.	No interaction with neuromuscular blocking drugs
10.	No pain on injection, venous sequelae and safe if injected inadvertently into an artery
11.	No toxic effects on other organs with no stimulation of porphyria
12.	No hypersensitivity reactions or release of histamine
13.	Water-soluble formulation with long shelf-life

incidence of PONV. Finally, pharmacological causes commonly include the use of volatile anaesthetic agents and some intravenous agents, e.g. etomidate and the opioids[45]. The precise role of nitrous oxide in the incidence of PONV remains unclear.

Respiratory advantages

General anaesthesia may cause postoperative hypoxaemia due to atelectasis, alterations in the functional residual capacity and shunting. The use of air/oxygen mixtures provide 'nitrogen splinting' as an aid to avoid atelectasis, and the use of volatile anaesthetic gases abolishes the hypoxic pulmonary vasoconstriction reflex thus increasing the possibility of postoperative hypoxaemia. In addition, TIVA also allows air/oxygen techniques for procedures such as bronchoscopy, without the associated pollution and concerns regarding the accurate delivery of anaesthetic gases.

Cost

One of the advantages of day surgery is the potential for cost savings. When analysing the cost of a procedure, several factors have to be taken into account including the individual costs of agents, equipment and disposables for both surgery and the anaesthetic, together with staff and general running costs. Hidden costs in day surgery may result from admissions caused by poor recovery or uncontrolled PONV and the resultant overnight hospital stay. Significant improvements in early recovery may save on nursing costs and a better overall quality of recovery could save on admission costs. These facts may produce actual overall savings, but it is difficult to cost the 'quality' of recovery. One fact remains clear, propofol is at least four times more expensive in real terms for maintenance, even compared to new agents such as desflurane[46]. However, the drug costs for a procedure are a small percentage of the total overall costs and therefore budgeting should perhaps be patient centred and not drug oriented.

Accumulation

When concentrating on TIVA alone one study, conducted with 14 882 patients, looked at the reasons for prolonged awakening, defined as >15 min from end of anaesthesia, and found an incidence of 6.8% with a mean wake-up time of 7.2 min. The factors associated with this were males, endotracheal intubation, age >65, abdominal surgery, infusion > bolus, the addition of isoflurane and finally a total dose of propofol >8 mg kg^{-1} [47].

Epileptiform activity

The true proconvulsant or anticonvulsant activity of propofol remains controversial. Clearly propofol does have anticonvulsant activity[48] and has been used as an effective treatment for status epilepticus as well as being used on mentally handicapped patients with treated epilepsy, when it produced no epileptiform activity[49, 50]. Some studies have found no detectable difference in EEG activity in patients with complex partial epilepsy[51] whereas other reports state that propofol is safe to use in patients with epilepsy[52]. Almost all anaesthetic agents have been associated with 'epileptic' EEG changes[53] and there are many case reports of 'epileptic' activity with propofol[54], especially with the rapid reversal of plasma levels after bolus injection as opposed to the slower alterations in plasma concentration associated with the reversal from infusions. The precise nature of the epileptic activity and accompanying tonic-clonic movements are often observer dependent[55], but it is clear that there is still no definite evidence as to the proconvulsant/anticonvulsant activity of propofol.

The future of TIVA in day case surgery

Propofol TIVA has a pharmacological profile which has advantages when used for neurosurgery, cardiac surgery, some thoracic procedures, but especially in day

Table 3. Advantages of propofol total intravenous anaesthesia

1.	No pollution
2.	No toxicity after repeated exposure
3.	Easy to increase depth of anaesthesia
4.	Decreased PONV
5.	Safe in malignant hyperpyrexia
6.	Respiratory parameters
7.	Intracranial pressure/neuroprotection
8.	Possible superior recovery profile

Table 4. Disadvantages of propofol total intravenous anaesthesia

1.	Cost
2.	Accumulation
3.	Awareness
4.	Allergies
5.	Epileptiform activity
6.	Not for children <3 yr
7.	Adverse publicity
8.	Variable and unpredictable dosage
9.	Higher incidence of movement during surgery
10.	Complex pumps
11.	Need for reliable venous access

case anaesthesia where the quality of recovery is vital. The use of short-acting opioids with TIVA, e.g. fentanyl, alfentanil or remifentanil appears to be a cornerstone of the technique. Computerized delivery systems may allow easier administration, and continued research into new short-acting opioids may yield further fine tuning of this technique.

Propofol TIVA offers anaesthetists an opportunity to increase their patients' feelings of wellbeing. In the current medical climate patient satisfaction plays an increasing role, and the use of a TIVA technique may reduce PONV, thereby preventing inpatient hospital admissions from busy day surgical units. In future, anaesthetists will have to consider seriously their day case anaesthetic techniques, and they may discover that TIVA techniques provide a real alternative to the use of the more conventional volatile anaesthetic agents.

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Laparoscopic day surgery: the process of recovery for women

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Day surgery procedures are rapidly increasing in number and complexity and will continue to do so in line with government policy. These changes warrant an assessment of the effect of decreased contact with medical and nursing professionals, particularly in the postoperative recovery phase. Semi-structured interviews used to investigate women's experiences of laparoscopic day surgery and their perceived recovery revealed that women in the study were not optimally prepared for the experience. In particular, they were surprised about the severity and duration of pain, extent of the disability, the level of disruption to their work and home lives and the need for physical and emotional support following the procedure. These findings have implications for pre- and postoperative education, community support services and aftercare.

Key words: Day surgery, laparoscopy, outcomes, recovery

Introduction

Ambulatory or day surgery is a growing phenomenon in healthcare in NSW[1]. The range of procedures practised overseas under day surgery conditions is increasing in scope and complexity[2,3] presumably because of technological advances and the pressure to contain costs. This trend will undoubtedly be reflected in Australia, if the rapidly increasing use of day surgery seen in NSW in the last decade is any indication. It has been suggested that 'day only admissions will constitute 45% of all admissions to NSW acute hospitals by the year 2001'[1]. Therefore, there is a need to assess the effect of reduced postoperative hospital stay on the recovery process following day surgery procedures.

There are many clinical studies describing the value of laparoscopy, relative efficacy of anaesthetics and the occurrence of nausea, vomiting and pain during the immediate postoperative period before discharge from Day Surgery Units (DSUs), both in Australia[4–6] and overseas[7–9]. Although day surgery is now an established type of hospital admission, with the possible exception of O'Connor et al.[10] there is no comprehensive study in Australian medical or nursing literature regarding the level of patient preparation for laparoscopy in day surgery situations or how well the patients recover at home. This paper presents the findings of a study which investigated women's perceptions of recovery after laparoscopic day surgery.

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Literature review

In Canada, Frisch et al.[11] investigated the outcome of day surgery for 23 pairs of patients and their helpers. The sample was drawn from the day surgery patients of three hospitals who were recovering from tubal ligation, arthroscopy and hand surgery. They were surveyed by questionnaire on postoperative days 1, 2 and 7; and followed up by telephone on days 2 and 7 and again 3 months later. Tubal ligation patients reported more problems with appetite, bowel movements, shoulder soreness and back pain than did hand surgery or arthroscopy patients[11]. The researchers found that respondents with no prior hospital experience reported more physical symptoms and more difficulties with activities of daily living than those with experience. One theme of their telephone interviews, on postoperative days 2 and 7, was whether 'previous surgical experience affected participants' expectations and plans for recovery'[11]. However this only applied to those having hand surgery as no others reported previous surgical experience. They also found that outcomes varied, depending on previous experience of ambulatory surgery, employment status, education, expectations and preparations for surgery. The researchers concluded that clients could have been helped by preoperative teaching about pain control and the effects of post-surgical recovery on usual activities[11].

There are obviously numerous factors which affect patients' satisfaction with the day surgery environment. These include the facilities, policies and procedures, staff interactions, adequacy of information and home

support[2,10,12]. O'Connor et a.[10] found that 351 of the 448 (78.4%) respondents would recommend a DSU for people having the same procedure. Gamotis et al.[13] in a study of 183 elective surgery cases found that outpatients were more satisfied with nurses and nursing staff than inpatients (although the difference was not significant). However, when respondents were asked whether the length of stay was appropriate, 52% of tubal ligation patients who had day surgery said that the stay was too short, compared with only 20% for patients undergoing the same operation as inpatients[14]. Areas of dissatisfaction included long waits between admission and discharge, lack of information and lack of postoperative feedback from surgeons[12].

Exploring satisfaction with day surgery, Frisch et al.[11] found that 22% (five) of all patients responding would have preferred to stay in hospital if they had the same surgery again. In addition, 23% (five) of the helpers were of the same opinion. Another Canadian study[14] found that 46% (14) of 31 tubal ligation patients randomly assigned to day surgery would also have preferred inpatient surgery, whereas only 7% (two) of 30 women randomly assigned to inpatient surgery would have preferred to go home on the same day. Frisch et al.[11] made the point that patients in the UK and Canada do not pay 'out of pocket' for surgery and hospitalization costs and thus may have a different outlook from people in the USA where a number of studies in the early 1980s (cited by Frisch et al.[11]) reported a high rate of patient satisfaction. However, Williams and Brett[15] point out that patient outcomes rather than simply patient satisfaction must be taken into account when evaluating quality of care.

Thomas and Hare[16] noted that the one study they found that showed a very low (4%) rate of dissatisfaction with same-day sterilization (by the electrocoagulation method) was also the only study in which women were routinely visited twice by a district nurse during their first week home after surgery. The women did not have to initiate contact with the health service (Brash, 1976; cited in Thomas and Hare[16], p. 447). They also found that 11 (31%) regretted their decision not to stay in hospital. Some of these reported being woken early for discharge from the DSU, difficulties of later pain and coping with children at home. Overall, 10 women had no discomfort, 18 experienced nausea or pain and eight had felt quite ill or experienced considerable pain. Only two of the women called on a general practitioner (GP) or nurse for assistance in the 24 h after the operation. It can be seen that women have widely varying experiences following apparently straightforward procedures. In a concurrent survey[16] of the GPs involved in these cases, one GP commented that early discharge was possibly more beneficial to the women's families than to the women themselves, and another that 'many women seemed ill-prepared for the level of discomfort they may experience', but many GPs had not realized that their patients had any problems.

Purpose of the research

This research by interview was undertaken as the first step needed to answer many questions that structured surveys have left unanswered. Semi-structured interviews allowed women's concerns about healthcare, family and financial responsibilities to emerge and show their relative importance. The interview technique was chosen to provide an opportunity to find out in some depth women's perceptions of the effects of surgery, their educational and support needs. These data were used to assist in adaption of existing questionnaires to the Australian context so that broader samples of patients can be surveyed.

Laparoscopy patients have been chosen for this study because this technique is frequently used in gynaecological outpatient surgery (principally for tubal ligation and diagnostic investigations) and the women undergoing the procedure have some characteristics in common. First, the impact of the procedure on the patient's comfort is not necessarily trivial and has been reported to persist for several days in a minority of cases[14,17,18]. Second, there is postoperative discomfort or pain thought to be caused by the presence in the abdominal cavity of residual carbon dioxide from the procedure[17]. All have general anaesthesia with possible related side-effects. Many have young children at home to care for, which may make day surgery a more attractive prospect[19] but may complicate convalescence.

The objective of the study was to report women's experiences of laparoscopic day surgery. The project aimed to:

- determine aspects of the postoperative experience, such as comfort, nausea and pain; emotional aspects; limitations to normal activity and duration of recovery;
- investigate if there was any difference in the reported experiences of women who had a laparoscopy in the DSU for the first time, compared to those who have had previous laparoscopy in the DSU;
- determine if there were any differences in the quality of data collected by telephone interview compared with personal interview;
- determine if there were any qualitative difference in data collected after 3 weeks compared to data collected 1 week post-procedure.

Method

Selection and recruitment

A convenience sample of 31 women was recruited from gynaecological laparoscopy patients at a large teaching hospital DSU during a 10 month period. Women were invited by letter to take part in the study by staff in the DSU or private gynaecologists at the time of arranging surgery. On the day of surgery, the DSU admitting nurse asked women who were willing to participate to

sign consent forms. Criteria for inclusion in the study included willingness of the gynaecologist to allow the patient to be approached and that the patient was fluent enough in English to be interviewed without an interpreter.

Allocation to interview type

Participants in any 1 week were allocated to one of the three interview conditions (see Table 1) in the order that they were required. Arbitrary allocation to the three interview groups was used to avoid introducing systematic bias into group comparisons. It was thought that women having more difficulty recovering or busier women might opt for later or telephone interviews.

For 21 participants who were interviewed, this was their first laparoscopy experience. Six of these had early interviews (group A), eight had late home interviews (group B) and seven had late telephone interviews (group C). Ten participants who were interviewed had experienced their second laparoscopy. Of these 10, five had early interviews (group A), two had late home interviews (group B) and three had late telephone interviews (group C).

Demographic questionnaire

A 12-item questionnaire was completed by the participant at the start of home interviews. This was a quick, convenient way of collecting short items of factual information on age, hospital experience, work commitments, family, education level, personal and domestic help received during the recovery period and medication taken during the postoperative 24 h.

Interviews

Home interviews (groups A and B)

The interviews were semi-structured and women were asked to describe their experience. A prompt list was prepared of topics to be raised by the interviewer if women did not mention them of their own accord. However, the interviewer was careful to ask neutral questions such as "how was your appetite?", "did you have any discomfort?". The whole home interview took from 30–60 min depending on the woman's conversational style and on the number of comments she wished to make.

Table 1. Description of interview timetable, showing number of participants in each group

Groups	*Interview first week postop*	*Interview third week postop*	*Phone Interview third week postop*
A	11		11 (repeated)
B		10	
C			10

Follow-up telephone interviews (group A)

This second interview concluded on the telephone assessed the women's recovery 3 weeks post-surgery. General questions were asked regarding her experience of recovery, progress or changes and use of health services between the first and the second interview. These calls were frequently completed in less than 5 min and were mainly factual in nature.

Telephone-only interviews (group C)

The interviewer rang at pre-arranged times and used a semi-structured interview schedule as for the home interview. Starter questions based on the experience and information gained from the face-to-face interviews were used as openers. The first two questions were asked consistently, however the remainder of the interviews followed the topics introduced by the women. Content of the interviews was recorded in longhand and these notes were reviewed and annotated immediately after each interview to minimize loss of information.

Transcription and analysis

Interview tapes were transcribed with all identifying details of subjects and medical specialists removed. Transcripts were read by at least two of the investigators. Those passages identified as of immediate interest to the investigators were marked for coding. Initial themes for cross-indexing of these passages were determined. Although a very specific index tree was initially employed for the analysis, it was found that this was too detailed and was replaced with broader categories.

Results

The demographic information (Table 2) reveals that of the 31 participants, 68% had spent less than 1 day in hospital before and 42% had had previous day surgery. One participant had spent 30 days and two had spent 10 days in hospital in the last year. Thirty-nine per cent had no children and one had five and two had four children. Twenty-three per cent of the women did not work outside the home. Fifty-five per cent of the participants spent 20 h or more on work outside their home.

The dominant theme which unites the majority of anecdotes related in the interviews is that of 'expectations'. Many of the participants reported that there were experiences they had not anticipated, surprises that they did not welcome and things that they would have liked to have known before the operation. Only a few reported that there were no surprises and that their general expectations were met. One woman reporting her first experience of laparoscopy, stated that "there were no surprises, the pain was very severe", but she had expected it to be (group C). Another was told by a friend to expect it to be very painful and so she was prepared for the pain (group C). Participants who had had previous operations of a similar nature compared their

Table 2. Demographic information

Number of laparoscopies	%
First	70
Subsequent	30
Age(yr)	**%**
≤20	7
21–30	19
31–40	61
41–50	13
51–60	0
≥61	0
Living situation	**%**
Live alone	3
With partner/spouse	19
With child(ren)	3
With others	13
With partner/spouse and child(ren)	48
With partner/spouse and relative(s)	3
With child(ren) and others	7
With partner/spouse, child(ren) and relative(s)	3
Level of education	**%**
School Certificate	13
Higher School Certificate	23
TAFE	23
Degree	32
Higher degree	11

experiences and frequently found that the current procedure was quite different. For example, one woman commented that she knew from the previous operation that the gas caused pain. However, on the first occasion she did not experience pain and consequently did not expect pain on this occasion (group A). Another woman was glad that she had been told about the pain in her chest from the gas, as she would have been very frightened if she had not known (group B).

Many said that they expected pain, but women having their first experience were surprised about the severity of the pain from the residual gas. One woman said that she didn't expect the degree of pain experienced, especially on the first day, and she had a severe cramp "like having a stitch" all the next day (group A). Another said "actually after the operation, that night and the next morning is agony" (group B), whereas others said that they expected pain but not to the extent that they felt it. One of the interviewees, a registered nurse who had worked in the area of gynaecology was still surprised by the severity of the pain she felt under her rib and diaphragm (group A).

The pain experienced was located either in the abdominal area or was referred pain felt in the upper chest and shoulders. They described the pain as "agony", "muscle cramp times ten", "absolutely killing me for 5 days", "like a dislocated shoulder", "like I was having a heart attack", "really painful", and "severe". Only one woman described the degree of pain as "tenderness". Although there were various answers to the question "What was the most effective way to relieve the pain" each woman seemed to find that a different strategy worked for her. These included lying down, sitting up, staying still, walking. There was also a range of responses for the question related to analgesics. Most of the women needed analgesia during recovery, some women found it useful, others did not.

Some women commented that they were uncomfortable for some time, "the gas really bothered me for about a week, I couldn't walk" (group B). Women generally did not expect the length of time required for recovery. A friend had told one women that she should "count on feeling off for a week" (group C). Many of the participants were also surprised about the degree of ill health and fatigue with some saying they felt debilitated and needed to rest and regain strength. One assumed that the operation was minor, but found that it was "pretty traumatic" (group B). Others, expecting to go out that night or be able to garden the afternoon of the operation found these activities were not possible. Specific problems included sutures rubbing, irritating, itching, wound weeping, inflammation, bruising, swelling and tenderness, bloating, distension, pressure on the bladder, dizziness, constipation, loss of appetite, nausea and having a "very very heavy period... the heaviest I've ever had in my life" (group B). For some the nature of the surgical procedure (for example tubal ligation) resulted in feelings of depression.

There were also surprises about the procedure and the extent of the operation reflected in one saying that she didn't realise that they went "into the vagina to push the uterus around" (group B). Another expected a premedication and found walking into surgery unnerving (group C). One woman was not expecting the anaesthetic to be so quick acting, while others wished they had known how long it takes for the effect of the anaesthetic to wear off (group C). A few women commented on the degree of bruising and that they had read in the information given by DSU that sutures dissolve, but they did not (group B).

The amount and value of knowledge gained from health professionals, particularly from the first experience participants attracted comments. One said "you're going in blind, really" (group B). Another woman recalled that

> the doctors just said it was a cut here, a cut there and a couple of stitches, you'll be all right sort of thing. It was a little bit more than that (group B).

A comment was made that "they have a habit of understating pain in the medical profession" (group B) but another felt that it is impossible to tell anybody how much it is going to hurt (group B).

The knowledge gaps that many of the women voiced included activities to avoid such as lifting, effect on the menstrual cycle, expected times of cessation of bleeding and resumption of intercourse. Some knew that they were not to use tampons for some time after the procedure, but others had not anticipated that they would need to use pads at all. Some worried about not 'tearing anything' and how long the stitches would take to dissolve. One woman who had previously experienced laparoscopy summarized her feelings about the lack of knowledge by saying

> Laparoscopy is a healthy person thing. Healthy people have no idea what hospital is like (group C).

Disruption to paid work was another unanticipated consequence. Many needed to take more sick leave than they had been told to expect, others reported that they were not given any advice about taking time off work at all. One participant thought she would be back to work the same day (group B). Those who returned also faced difficulties. For example one woman described the embarrassment of experiencing a very heavy period presumably as a result of the procedure. She worked in the office with men and found it very upsetting because she found she was going to the toilet every half hour to check her sanitary pad.

Those that said they went back to work generally were not able to lift or do any strenuous work. Although one woman said that it "didn't stop me from my work at all", she had previously commented that when she was at work she had told her colleagues that she would not be able to lift. She also said that while she was at work she sat there with a hot pack on her stomach as it was still tender.

Interruption to home life occurred as a result of the procedure, with several unable to do housework or prepare meals. If adequate information had been given, meals could have been prepared beforehand. When returning to the normal level of household duties 6 days after the procedure, another woman commented that she had "quite a bit of pain and soreness". The same woman also kept her 13 yr old from school to care for her on the first day after the procedure, as her husband had to go interstate (group B). Some women suggested that it would not be a good idea to come home from the operation to look after the children. The advice was either to stay in hospital (if possible) or have someone look after them until you are well enough to do so. One woman said that it was good to be going home after the operation (rather than staying in overnight) because then you are not alone (group A).

Many of the women said that they needed both physical and emotional support from their families or others. The extra demands made upon the family members ranged from giving assistance with showering, supporting emotional needs, assisting with preparation of meals, getting into the car, changing the dressing and child minding. A few of the women suggested that the families need to be informed regarding the general health and capabilities of their spouse/mother and the effects of the surgery on her. Not to drink alcohol, drive or work for at least 24 h after the procedure needed to be made explicit. One "need(ed) someone to cocoon me and look after me" and that the next day (post-operation) should be a "total caring supportive day – treated as an invalid" (group A).

There is an obvious need for the family to be aware of the extent of the operation and the debilitation that it can cause. Seventy-seven per cent of the participants received assistance from one or more adults and 29% received assistance from one or more young people. There was no indication that any of the women had utilized community or private nurses and only a few of the women had contacted their GP for advice concerning their recovery.

In response to the question "Was there anything the day surgery staff could have done to make your stay more comfortable?" most said that the staff were very good and "that they knew what they were doing" (group A). The women appreciated that the "nurses kept checking to see if you're all right" (group A) and "when I got on the table the nurse actually held my hand when I went under and that was really important to me..." (group B). One woman said that she was asked by the doctors and nurses if there was anything she wanted to ask about. However there were a few women who noted that they did not know what questions to ask. Another was thankful for the telephone call from the unit the next day "just when I needed to talk to them they actually rang me" (group B). Another said "you still couldn't get over the feeling or fact that it was production line operation, but no, it wasn't rushed" (group A).

Discussion

According to Birch[20] if day surgery was "the buzzword of the 1980s then aftercare service is likely to replace it in the 1990s". It has been demonstrated by this study and others[11,16,20,21] that some cohorts of patients attending DSU need home support on discharge. For example, Frisch et al.[11] reported that patients experienced difficulty with daily activities including housework, meal preparation and child care and more than 30% required help with bathing and dressing. Many of the women in the current study had most of the household duties accomplished prior to their surgery or had other members of the household attend to these tasks. However, there were examples of women who were unable to ignore these responsibilities which supported the finding that some women are unable to put aside family responsibilities in favour of their own health, as has been reported by Graham, 1984 and Blaxter and Paterson, 1982 (cited in Thomas and Hare[16]). According to Thomas and Hare[16] day surgery encourages them to maintain their usual role despite the surgery and many of the respondents in this study found this difficult.

As a result of the day surgery, women were not only unable to attend to their families' needs, they also needed assistance to attend to their own personal care. This supports the findings of O'Connor et al.[10] that 34% of the respondents stated that someone took time off work or gave up their usual activities to care for them. These types of unexpected interruptions to daily routines were also found in the current study.

The severity and duration of the pain was not expected by most of the women. Many required analgesia, in addition to other techniques such as hot water bottles, positioning and maintaining mobility, although there was not a consensus as to which technique was most beneficial. The duration of recovery was also

longer than expected and this resulted in many of the women requiring more sick leave than anticipated. It was the exception rather than the rule for women to return to their usual activities as they had expected. There is a need for women undergoing this procedure to have realistic expectations for recovery which supports Birch's[20] point that it is important that patients should not hold misconceptions as to their postoperative abilities following day surgery.

The frequency of surprises and unexpected experiences demonstrates the need for preoperative and postoperative education. The timing and method of imparting this information may need to be reviewed. Preoperative anxiety and the effect of anaesthetic drugs can impair understanding and retention of information. Some women said they would have liked to receive a booklet which outlined the procedure and postoperative care to allow them to be thoroughly prepared for the surgery and aftercare. Some DSUs overseas utilize preoperative clinics to convey preoperative education[22–24]. This is designed to familiarize the patient with the day surgery centre, decrease anxiety, inform the patient of the postoperative recovery and in some cases also educate the care giver[22,25,26].

Concerns and unanswered questions related to ovulation and menstruation are very important to these women as they have frequently undergone laparoscopy to investigate infertility or for permanent sterilization. Because of the short duration of their hospital stay, most women did not feel adequately informed about the procedure, diagnosis and prognosis. A common complaint found here which supports the study of O'Connor et al.[10], was the length of time (often up to 6 weeks) before visiting the specialist. One had had a diagnostic procedure for cancer and was still unaware of her prognosis (3 weeks post-surgery).

The advantages and disadvantages of day surgery compared to inpatient surgery had been considered by some women. If the women had children at home the benefit of staying in hospital was acknowledged but this would obviously require another adult to attend to the child(ren)'s needs and might reduce the opportunity for family support. Staying in hospital might also enable the woman to see the specialist prior to discharge. The reduced contact time with doctors has been reported as a factor leading to patient dissatisfaction with day surgery[10,14].

Health services were not utilized by many patients following the procedure. Some contacted their GP and occasionally the specialist for information regarding the management of sutures and inflamed wounds. There was however, no effort to contact community or private nurses, despite many of the women requiring assistance in activities of daily living for a number of days postoperatively. Further investigation is required to quantify the potential demands for domiciliary care as a result of the increased frequency of day surgery.

There appeared to be little difference in the quality of information obtained between the interviews held after 1 week and those held 3 weeks postoperatively. Regarding the difference between the two interview methods (telephone and face-to-face), as expected the use of the telephone seems to be more suitable for completing large numbers of questionnaires, whereas face-to-face interviews give richer, fuller transcripts.

There seemed to be a therapeutic factor embedded within the interview process for some women. For these women the interview was a welcome opportunity to describe their experiences and resolve some of their feelings. When the interview was held within the first week, women had the opportunity to verbalize their feelings and get questions answered. For some, the later interview meant that they spent more time 'stewing' over their feelings and thoughts regarding the experience, therefore the emotions expressed in the later interviews were, in some cases, more intense. In contrast to the findings of other studies[11] there did not seem to be a difference between the experiences of women who were having laparoscopic day surgery for the first time and those who had had previous operations.

Conclusion

This investigation of women's experiences of laparoscopic day surgery using semi-structured interviews identified knowledge gaps and sequelae of a physical, social and emotional nature and for which the participants were not prepared, irrespective of their previous day surgery experience. This study supported the development of a questionnaire which will now be used to determine the outcome of laparoscopic day surgery for a wider population. In the interim this pilot study, although small, generated some clear deficits in the quality of preparation of female laparoscopic patients. This is important as improvements in the preparation of patients can be made by nursing and medical collaborators without a great deal of cost or effort.

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Day case laparoscopic cholecystectomy – a feasibility study

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The feasibility of performing laparoscopic cholecystectomy on an outpatient basis was evaluated in 55 selected patients who underwent the procedure with careful back-up. Nine per cent of patients required overnight hospitalization whereas 5% were readmitted at a later date. Fifty-nine per cent of patients described their postoperative pain as severe or moderately severe and 27% complained of vomiting or severe nausea. Despite these findings, 66% of patients expressed complete satisfaction with the procedure as performed and 82%, given the choice, would have opted for the same method again. The advantages to the patient are the high likelihood that the procedure will take place as planned and they are able to convalesce in familiar surroundings. The advantages to the hospital are the freeing up of inpatient beds and potential cost savings.

Key words: Ambulatory surgery, cholecystectomy, laparoscopic

Introduction

Improvements in patient care together with increasing pressure on inpatient beds have resulted in an ever-increasing proportion of surgical procedures now being performed on an outpatient basis. The field of surgery in which there has been the greatest innovation of late is that of minimally invasive techniques using laparoscopy and microchip video systems. In particular, laparoscopic cholecystectomy has become established as the method of choice for patients in whom gall bladder removal is required[1–4]. The lack of tissue trauma is such that patients are often fully mobile within a few hours of surgery.

The aim of this study was to assess prospectively the feasibility of performing laparoscopic cholecystectomy as an outpatient procedure, in terms of safety, logistics and patient satisfaction.

Patients and methods

All patients requiring cholecystectomy under the care of one consultant surgeon over a 2 yr period from February 1993 to February 1995 were considered for entry into the study. Those selected were required to fulfil the standard criteria set for day case surgery; in particular, to fall within anaesthetic ASA (American Society of Anesthesiology) categories I and II. Patients were also required to be driven home, with a journey time of not more than 1 hr and to have responsible adult care that evening.

Excluded from the study were patients likely to require exploration of the common bile duct, patients with evidence of current acute cholecystitis or patients likely to require a prolonged procedure, including those with multiple abdominal scars.

All patients were given an information sheet and were seen in a pre-assessment clinic 1 week prior to surgery to identify any cardiorespiratory problems. Admission to the day unit subsequently occurred at 8 am on the morning of surgery.

Anaesthesia was performed in a standard fashion: after induction by propofol, maintenance was by inhalation of a nitrous/oxygen mixture with 1% halothane. Each patient received 100 mg voltarol (diclofenac sodium) per rectum at the start of the procedure unless contraindicated for medical reasons.

After antiseptic preparation of the skin, CO_2 was insufflated via a Verres needle to a maximum pressure of 13 mmHg. Operations were performed via two 10 mm and either one or two 5 mm endoscopic ports using standard techniques of dissection. Marcaine 0.5% was injected into the port sites at the end of the procedure.

In the recovery ward, opiate analgesia was avoided unless pain control was poor. A postoperative assessment was performed after 3 hr; if the patient had remained stable, pain and nausea were minimal and they were fully alert and oriented, they were discharged home with a further information sheet containing relevant contact telephone numbers and a combination of

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voltarol and coproxamol (dextropropoxyphene and paracetomol) analgesia.

Patients were given a questionnaire to complete in the immediate postoperative period and all of these were returned. Patients were asked to grade pain and nausea using a simple scale of severe, moderate, mild and nil. They were also asked the number of days spent in bed on return home, the number of days before return to normal activity, their overall satisfaction with the procedure and, finally, given the choice again, would they still elect to have the procedure done as an outpatient. Any further problems were discussed at a review clinic 1 month post surgery.

Results

Over the 2 yr period, 55 patients were recruited to the study from a total of 227 patients requiring laparoscopic cholecystectomy. Their details are recorded in Table 1. No patients required conversion to open surgery. The immediate postoperative admission rate was 9% (four patients) whereas three patients were subsequently re-admitted after uneventful discharge (Table 2).

Postoperative pain and nausea scores are shown in Figures 1 and 2, respectively. Fifty-nine per cent of patients described their pain as moderate or severe, although only 27% of patients described vomiting or severe nausea.

The mean number of days spent in bed postoperatively was 2.5 (range 0–7) whereas the mean number of days elapsing before return to normal activity was 15 (range 2–42).

Subjective patient satisfaction is shown in Figure 3. Overall, 66% of patients were completely satisfied with the procedure whereas 82%, when asked directly, said that given the choice, they would still have had the procedure performed on a day case basis.

Discussion

This study supports the proposition that laparoscopic cholecystectomy can be performed safely on an outpatient basis. Re-admission rates are comparable to published, non-day case series[2, 3] and are acceptably low. In particular, no serious events occurred which would have been avoided by overnight hospital admission.

Nevertheless, there is a price to be paid in terms of patient comfort. Despite 'pre-emptive' analgesia in the form of a voltarol suppository and the use of local anaesthetic, 59% of patients still described their postoperative pain as moderate or severe and 27% described severe nausea or actual vomiting. This resulted in only two-thirds of patients describing the experience as completely satisfactory. The fact that 82% of patients would, however, still choose the outpatient method probably reflects the appeal of convalescing in a familiar environment, and the feeling of confidence that the procedure would take place as planned.

One of the effects of a change in working practice such as this is the shift in postoperative care to the community, and clearly access to adequate backup is essential[5]. Over a quarter of patients sought advice from the hospital following their discharge although, interest-

Table 1. Patient details

Number of patients	55
Male : female ratio	1 : 9
Mean weight (kg)	72 (range 49–87)
Mean duration of operation (min)	59 (range 30–90)

Table 2. Immediate and late re-admissions following day case laparoscopic cholecystectomy

Admission rate	No. of patients (%)
Immediate	5 (9)
Operative reasons	2
Nausea	1
Faintness	1
Pain	1
Late	3* (5)

*10th postoperative day – suspected biliary leak; 3 months – unrelated abdominal complaint; 14th postoperative day – pain, unknown cause.

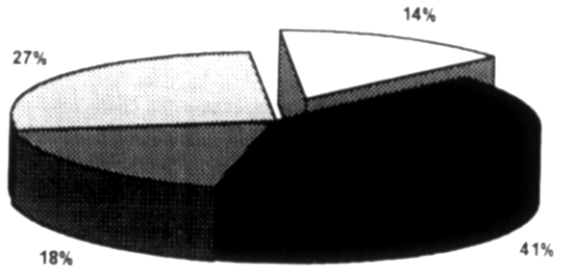

Figure 1. Postoperative pain score following day case laparoscopic cholecystectomy. ■ Severe; ▩ moderate; ▨ mild; □ no pain.

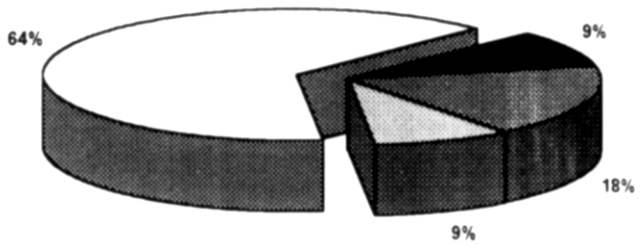

Figure 2. Postoperative nausea score following day case laparoscopic cholecystectomy. ■ Vomiting; ▩ severe nausea; ▨ mild nausea; □ no nausea.

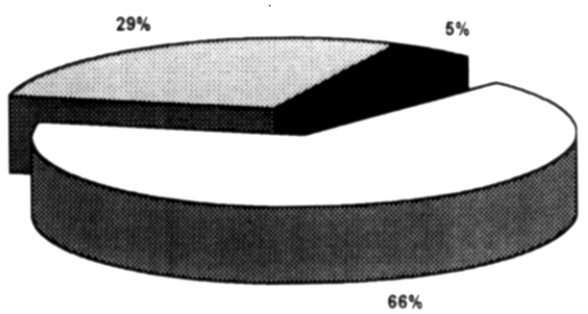

Figure 3. Patient satisfaction following day case laparoscopic cholecystectomy. □ Completely satisfied; ▨ acceptable; ■ unsatisfactory.

ingly, no patients requested visits from their family doctors in the immediate postoperative period.

The small number of previous studies on outpatient laparoscopic cholecystectomy[6–10] support the findings of this study. Admission rates are generally of the order of 10–20%, and there are no reports in the literature of any adverse sequelae resulting from the omission of overnight hospitalization. Careful patient selection is emphasized as most important in achieving a successful series. As in our experience, factors likely to lead to the patient requiring hospitalization are advanced age, major associated health problems, acute cholecystitis and prolonged surgery[10]. Also emphasized are the potential cost savings and logistical advantage which may be achieved by avoiding hospital admission and the freeing of inpatient beds.

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The results of direct access day surgery for minor operations

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Direct access surgery (DAS) is a method of patient management which eliminates many of the common delays in providing treatment. It relies on accurate correspondence from general practitioners and a degree of confidence in these referrals so that preoperative assessment is made on the day of surgery and postoperative wound management performed in the community. This is a retrospective study of 5776 patients treated over 5 yr for minor surgical procedures under the care of one consultant at Kingston NHS Hospital Trust. Half of these patients, mostly with skin lesions, were dealt with using the direct access approach. No clinical problems were experienced in those patients treated by DAS and a very significant reduction in waiting time for more serious conditions was achieved in the outpatient department. It is concluded that DAS is the method of choice for minor skin lesions and that the technique should be used in the future for more complex procedures.

Key words: Day surgery, local anaesthesia, direct access surgery, minor procedures

Introduction

Due to increased demand in the outpatient department more efficient ways for the management of minor surgical procedures were sought. The standard mechanism of referral was by letter from general practitioners (GPs) which generated an outpatient appointment to assess the suitability of the referral and plan a date for the procedure. After surgery an appropriate date for removal of sutures was made at which the results of histology and any further treatment were advised. Although this was the traditional method, it was felt to be time consuming and an inefficient use of resources.

Direct access surgery (DAS) gets rid of all the outpatient appointments except that for the surgery itself. It was felt that this might be the ideal way of dealing with increased minor surgery workloads.

Method

All GP referral letters were seen by the consultant surgeon and, if deemed suitable, the patients were immediately sent an appointment for same day surgery in the Surgical Day Unit (SDU). The factors of importance in the letter of referral related to the age of the patient – very young children are often not suitable for local anaesthetic procedures, the mobility and social circumstances of the patient, any drug therapy such as anticoagulants, availability of patient- or relative-supplied transport and if possible relevant dates of social commitments such as holidays, in order that non-attendance could be minimized. It was also important to know the site and size of the lesion and the GP's working diagnosis. If, from this information, there was any doubt about DAS an outpatient appointment was sent to avoid wasting time at a Day Unit operating session.

On arrival at the Day Unit each DAS patient was assessed by the consultant for their suitability for surgery and a note made of those not suitable. Non-attendance was also recorded.

Following surgery the patients were advised about wound care and the date on which their sutures should be removed by the practice nurses. They were also told that their pathology results would be sent to their GPs as well as a letter to them indicating whether the lesion was benign or would need further surveillance or treatment.

A record of the histological diagnoses of the DAS patients and conventional surgery patients was made.

Results

Over a 6 yr period (May 1988–May 1994) 5136 patients underwent minor surgical procedures at the SDU of Kingston Hospital NHS Trust. Some patients treated at satellite local hospitals were not included.

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Table 1. Diagnosis in minor surgery under local anaesthetic in SDU between May 1988 and May 1994

	DAS		*Conventional*	
Malignant skin lesions	389	(13.9%)	223	(9.5%)
Benign skin lesions	1783	(63.6%)	826	(35.3%)
Nail surgery	27	(1.0%)	333	(14.2%)
Other	601	(21.4%)	948	(41.0%)
Total	2800	(100%)	2336	(100%)
		Total 5136		

A total of 2800 (55%) operations were performed as DAS. Of those selected by letter, 198 (6.6%) did not attend and this compared with 51 (2%) who did not attend in the control group. A small number of patients, 25 (1%) were deemed unsuitable for DAS treatment when assessed on the day of attendance.

The diagnostic differentiation between DAS patients and those assessed conventionally is shown in Table 1. Non-malignant skin lesions accounted for 63% of the DAS patients compared with 35% of the control group and this was the largest subgroup in both. The DAS group mainly had skin lesion excision whereas the control group also contained nail surgery and vasectomy.

Malignant skin lesions were found in 389 (13.9%) of DAS patients compared with 223 (7.5%) of those assessed in outpatients (χ^2 $P<0.025$) and were made up of basal cell carcinoma, Bowens disease, squamous carcinoma and malignant melanoma (Table 2).

The DAS patients did not have a pre- or postoperative outpatient consultation which released a total of 5604 outpatient attendances in a 6 yr period. Assuming three clinics per weeks of 50 consultations, this was a saving of 37 weeks. Patients with non-urgent referrals were seen 9 months earlier as a result of using this method.

Discussion

Over the past 5 yr we have shown DAS under local anaesthetic to be extremely beneficial in terms of time saved in hospital specialist appointments. This form of surgery has so far been used only for minor surgery. If it is to be expanded to include more complex procedures, a series of rigorous guidelines will need to be achieved for GPs to select patients appropriately.

DAS provides an efficient route for skin lesions to be removed by a skilled hospital surgeon instead of within the primary health setting, where lesions are more likely to be inaccurately diagnosed and under-excised[1,2]. The clinic appointments which are saved by DAS would have served not only to assess lesions but also to provide an opportunity for the patient to acquire further information and relieve any anxiety. The lack of these beneficial factors in DAS is reduced by good pre- and postoperative communication to both patient and GP, especially concerning the outcome of histological analysis.

Table 2. Histological diagnosis of malignant skin lesions removed in the SDU between May 1988 and May 1994

	DAS		*Conventional*	
BCC	239	(61.4%)	124	(55.6%)
Bowens disease	70	(18.0%)	30	(13.5%)
Squamous carcinoma	36	(9.3%)	26	(11.6%)
Malignant melanoma	40	(10.0%)	41	(18.4%)
Others	5	(1.3%)	2	(0.9%)
Total	389	(100%)	223	(100%)

Some patients for vasectomy and hernia repair have been referred for DAS by a small group of GPs but the information imparted regarding side-effects and complications in these procedures and the time required for the patient to make up their own mind, especially in the case of vasectomy, may make the method difficult. It is unclear how much extra work will be needed by the GPs or their nurses to make DAS work effectively. As only local anaesthetic was used in this series it is likely that the time needed is considerably less than that experienced by Bradshaw et al.[3] where patients having DAS under general anaesthetic were assessed by GPs.

Smith and Gwynn[4] suggest that there could be savings in outpatient appointments, which is borne out by this report. For the first time the consequences of DAS for minor lesions has been quantified and the benefit to those patients who do need outpatient consultations clearly shown.

DAS under local anaesthetic is shown to be most suitable for skin lesions and will have a place in more complex procedures in the future, thereby saving even more outpatient consultations.

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Day surgery dilatation and curettage: patients' experiences

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The purpose of this study was to describe the quality of care received by day case dilatation and curettage (D&C) patients. Data were collected by mailed, self-completed questionnaire administered to consecutive patients undergoing D&C in 35 NHS hospitals. The results from these questionnaires were used to assess satisfaction with the process of care, use of post-discharge services, rate of complications, effectiveness of operation, speed of recovery and overall satisfaction of the patients. The results showed that day case patients were very satisfied with the care they received from doctors and nurses. The majority of day case patients received information before and during their stay. The most common postoperative complication was bleeding, which affected 38% of day cases. We were able to conclude that performing D&C as day surgery is acceptable to patients and day surgery is an appropriate setting for this procedure.

Key words: Day surgery, dilatation and curettage, patient satisfaction

Introduction

Dilatation and curettage (D&C), a common minor gynaecological procedure used in the management of menstrual bleeding, has been identified as suitable for day surgery[1]. However, the proportion of cases actually performed on a day case basis varies widely. One British study[2] showed that the proportion performed as day cases in the eight health districts of the Oxford region varied almost fourfold, from 22–81%. Whereas some of the variation may have been related to differences in the availability of facilities, surgeons' concerns about the appropriateness of the procedure for day surgery and lack of information about patients' preferences may constitute additional barriers to the adoption of day surgery D&C.

This study addresses these issues, and reports on women's experiences of day surgery D&C in order to examine its acceptability.

Methods

The development of the questionnaire to assess patients' experiences of surgery has been described elsewhere[3]. Briefly, it was either given, together with a stamped addressed envelope, to the patient on discharge to be completed and returned 3 weeks later, or was mailed to the patient 3 weeks after discharge. The actual method of carrying out the survey varied from hospital to hospital due to organizational differences. However, recommendations were made to each hospital about procedures to maximize response rate by following up non-responders: this resulted in an average response rate across all hospitals of 60%. Specially written software allowed patients' data to be entered by hospital staff. A copy of the local database could also be sent for inclusion in a national comparative database[4]. The current study used this aggregate database, which at the time of analysis contained data from 35 NHS hospitals in the UK. From this, all patients undergoing D&C were selected to produce a sample for analysis of 583 day cases.

The questionnaire responses of patients who had undergone D&C as a day case procedure were summarized to examine the quality of care provided to these patients in the areas of: (i) in-hospital care (attitude and availability of doctors and nurses, provision of information); (ii) post-discharge care (medical and lay care); (iii) complications; (iv) effectiveness (changes in symptoms, changes in day-to-day life, speed of recovery); and (v) overall satisfaction. Column percentages in some tables sum to less than 100% as 'Not applicable' answers given by patients are not shown.

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Table 1. Age distribution of day case patients and inpatients

Age group (yr)	*Day cases* n	%
15–34	86	14.8
35–54	429	74.0
55–74	65	11.2

Results

Age

The majority of this group of patients (74%) were aged between 35 and 54 yr at the time of the operation.

In-hospital care

High levels of satisfaction were reported by day case patients with the attitude of and availability of help from medical staff. The level of satisfaction with nurses was higher than that with doctors.

Most day cases (over 80%) had been given an explanation of their treatment both before and during their hospital stay. In contrast, only 60% (SE 2.0) had been given written information before admission and just under half (49.2%, SE 2.1) had been given written information during their stay.

Post-discharge care

One area of concern about the use of day surgery centres on patients' use of services after discharge from hospital. One particular worry is that day surgery simply shifts the burden from the hospital to primary and community care. The most common provider of formal care to day case patients was the general practitioner (GP), who had been seen by almost a third of patients during the 3 weeks since discharge. The next most common source was the hospital outpatients' department which had been attended by approx. one in 10 patients, whereas the use of other services was reported by only a small proportion of patients. In addition, a significant amount of care was provided by lay carers: about a third of women had 'quite a lot' or 'a great deal' of help from friends, family or neighbours after leaving hospital.

Table 2. Number and percentage of patients satisfied with the attitude of and availability of help from doctors and nurses by patient group

	Day cases n	%	*SE*
Attitude of nurses	569	97.6	0.6
Attitude of doctors	519	89.0	1.3
Availability of help from nurses	565	96.9	0.7
Availability of help from doctors	470	80.6	1.6
	470	80.6	1.6

Table 3. Number and percentage of patients given information about their treatment at different stages of their care by patient group

	Day cases n	%	*SE*
Given explanation before admission	479	82.2	1.6
Given written info. before admission	351	60.2	2.0
Given explanation during hospital stay	520	89.2	1.3
Given written info. during hospital stay	287	49.2	2.1

Complications

Not surprisingly, the most common complication reported by day case patients was bleeding, reported by more than one-third of all patients. About 7% (SE 1.0) of patients reported other complications. These included backache, stomach pain and weakness. A small minority of patients reported postoperative infection and an allergy or drug reaction.

About one in 10 patients complained of a 'fair amount' or 'a great deal' of pain during the first 24 h. However, only 2.8% (SE 0.7) of patients went on to report that pain control was an unsatisfactory aspect of their care, suggesting that they did not perceive that anything more could be done to control their pain.

Effectiveness

A large proportion (42.7%, SE 2.1) of patients felt that it was too soon to say whether or not their symptoms had changed.

About a fifth of patients stayed in bed for a day or more and about two-thirds stayed indoors for 1 or more days. Three weeks after surgery fewer than 10% of patients had difficulty with bathing, going upstairs and shopping. About two-thirds of patients felt that the actual speed of recovery had been about as they had expected (63.5%, SE = 2.0).

Overall satisfaction

Overall satisfaction was high – 86.6% of patients (SE 1.41) would recommend day surgery to a friend in a similar situation.

Table 4. Number and percentage of patients using formal and lay care after discharge by patient group

	Day cases n	%	*SE*
GP	177	30.4	1.9
Practice nurse	12	2.1	0.6
Hospital outpatients	61	10.5	1.3
District nurse	2	0.3	0.2
'Great deal' or 'quite a lot' of extra help from family/friends	188	32.2	1.9

Table 5. Number and percentage of patients reporting postoperative complications by patient group

	Day cases		
	n	%	*SE*
Infection/discharge	12	2.1	0.6
Allergy/drug reaction	5	0.9	0.4
Other complication	39	6.7	1.0
Bleeding	224	38.4	2.0
Fair amount/great deal of pain	65	11.2	1.3
Readmission	14	2.4	0.6

Table 6. Number and percentage of patients reporting changes in their symptoms since leaving hospital by patient group

	Day cases		
	n	%	*SE*
Better	129	22.1	1.7
No change	120	20.6	1.7
Worse	24	4.1	0.8
Too soon to say	249	42.7	2.1

Approximately 10% of both groups gave no answer.

Discussion

The primary objective of this paper was to describe the experiences of D&C patients. Based on this sample, they were satisfied with their interactions with medical staff (a common finding in such surveys), and the majority had received an explanation of their operation both before and during their stay in hospital. A smaller proportion had also been given written information regarding their operation. Postoperative complications were experienced by a significant minority of patients: a third suffered bleeding and one in 10 complained of significant pain. After discharge about a third saw their GP in relation to the operation and about the same proportion required help from family or friends.

Increasing the use of day surgery necessitates demonstrating that it is both acceptable to patients and that it does not result in a reduced quality of care. Overall satisfaction was high in this group of D&C day surgery patients, as was satisfaction with medical staff. The behaviour of medical staff is one of the most important predictors of patient satisfaction[5].

Table 7. Number and percentage of patients who still experienced limitations in their daily life 3 weeks after surgery, by patient group

Effect of operation	*Day cases*		
	n	%	*SE*
Difficulty bathing	6	1.0	0.4
Difficulty going upstairs	14	2.4	0.6
Difficulty shopping	38	6.5	1.0
Difficulty lifting heavy objects	66	11.3	1.3
Staying in bed 1+ days	125	21.4	1.7
Stayed indoors 1+ days	396	66.2	2.0
Took it easy 1+ days	508	87.1	1.4

Information provision to day surgery patients was good. A large minority of patients however reported significant levels of pain, which may affect use of post-discharge services: compliance with follow-up visits has been shown to be significantly related to pain control for vaginally performed gynaecological procedures[6].

The Royal College of Surgeons' guidelines[7] indicate that patients should not expect an immediate resumption of normal life after minor surgery. Day case patients do appear to compensate for their shorter stay in hospital by staying indoors and in bed at home after discharge.

Concern has been expressed about the economic consequences of transferring procedures to a day surgery setting, as savings to the hospital may be offset by increases in costs due to an increase in complications and to an increased use of primary and community services by day case patients. However, neither the complication rate nor the use of formal services were found to be high in this study, possibly as a consequence of careful day case patient selection.

A second concern is that an increased rate of day surgery is achieved at some cost to the patient, through a slower recovery and increased need for lay care. It is difficult to examine this issue without a matched group of inpatients for comparison. However, *post-hoc* analysis of the national comparative data shows that the proportion of day case patients reporting the need for lay care is similar to that for inpatients undergoing D&C selected from the same database. A total of 32.2% of day case patients reported significant extra help from family/friends compared to 39.2% of inpatients, a non-significant difference. (The age distributions of the two patient groups are similar.) This suggests that day surgery need not result in an increased need for lay care following D&C.

Criticism has been directed at the high levels of D&C in the UK and at the inappropriate use of diagnostic D&C[2,8,9]. This study was only able to address the issue of whether or not day surgery is an appropriate setting for this technique, a relevant question given that while the debate over the use of D&C continues, it will still be carried out though perhaps at a lower rate. Patients were satisfied with day surgery D&C and the quality of the service appears to be high.

Several caveats remain regarding the interpretation of these results. The first is that given the response rate (60%) the results may represent the experiences of a self-selected group of either satisfied or dissatisfied patients. However, the overall satisfaction rate is comparable to that found in similar surveys[10–12]. The possibility also remains that recruitment bias may exist. Because of the nature of this study it was not possible to control the survey methods used by individual hospitals strictly. Though recommendations were made, they may not have been followed in all hospitals. It is obviously important that hospitals undertaking such surveys follow strict guidelines regarding the administration of questionnaires and follow-up of non-responders, in order to ensure accurate interpretation of results.

In summary, day surgery is an appropriate setting for D&C: overall satisfaction is higher than with inpatient care for the same procedure. Studies of day case patients undergoing clip sterilization, tubal diathermy and non-laparoscopic gynaecological operations have reported that up to 30% regard their stay as too short[13–15] and it has been reported that a small proportion of patients find obstetric and gynaecological procedures generally traumatic[16]. D&C does not appear to share these characteristics.

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Microlaryngeal surgery on a day case basis

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The aim of this study was to assess the clinical safety of performing microlaryngeal surgery (MLS) under general anaesthesia in selected patients in the ambulatory setting. Twenty-two adult patients were scheduled to have tissue specimens of the larynx taken by biopsy (54%), for vocal cord polypectomy (41%) or for vocal cord cyst excision (5%). Twenty-one ASA I and II patients (95%) were discharged home the same day of the procedure. Two of them presented with laryngospasm after extubation of the trachea. One ASA III patient (5%) had to be admitted overnight because of severe laryngospasm and bronchospasm, but was discharged the day after the operation. None of the patients had significant complications after leaving the recovery room (mean stay 85 min). There were no re-admissions to the hospital. Our data suggests that microlaryngeal surgery in selected patients can be safely performed on a day case basis.

Key words: Microlaryngeal surgery, microsurgery, direct laryngoscopy, microlaryngoscopy, general anaesthesia, ambulatory surgery

Introduction

Departments of Health, Royal Colleges and employer groups throughout Europe encourage the utilization of ambulatory surgery. Many set a target of 50% ambulatory activity for elective surgical procedures. This has resulted in a continually increasing list of operations being performed on a day case basis[1]. Cost control has been a major reason for this phenomenon. Nevertheless, before another procedure is recommended as suitable for the ambulatory setting, patient safety and quality of care have to be assessed[2].

Many otorhinolaryngology procedures are currently undertaken on an ambulatory basis. Tonsillectomy and adenoidectomy, with or without myringotomy and tympanic tubes insertion, constitute the majority of cases, especially in paediatric patients[3]. Septal surgery is also a routine day procedure at some hospitals[4]. Closed reduction of nasal fracture, foreign-body removal, mastoidectomy, stapedectomy or tympanoplasty have also been promulgated[5]. Microlaryngeal surgery (MLS) assists in the diagnosis and treatment of several laryngeal lesions, and it is common practice for it to be performed under general anaesthesia, keeping the patient in hospital overnight[6]. However, significant complications are very rare after the immediate postoperative course[6].

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The aim of the present study was to assess if MLS under general anaesthesia is safe and convenient in selected patients when conducted on an outpatient basis.

Methods

Setting

Sierrallana's hospital is a basic general hospital of the Spanish National Health Service, located in an industrial area near Santander. It provides primary to secondary healthcare to 166 654 people. A 10-bed day hospital, located beside the operating theatre, acts as an outpatient anaesthesia clinic and as an admission/discharge ambulatory setting. The operating rooms, the postoperative recovery room and the staff are all integrated, not being specifically dedicated for ambulatory surgery.

The study protocol was approved by our Institutional Ethical Committee.

Selection criteria

We only included in the study cases that presumably would not cause extensive trauma to the airway, such as the excision of small lesions, like polyps, or biopsies of neoplasms of the larynx. Large masses and subglottic lesions that could produce significant airway obstruction due to inflammatory reaction or haemorrhage were excluded. Before taking the decision to perform the procedure under general anaesthesia, an attempt with topical anaesthesia was undertaken in the case of every

patient, using a flexible fibroscope with a work channel, as in the method described by Riancho et al.[7].

Patients initially considered to be appropriate candidates for ambulatory MLS were those in physical status I (healthy patient) and II (patient with mild systemic disease) of the American Society of Anesthesiologists (ASA) classification. If the patient had a non-incapacitating severe systemic disease (physical status III) it was essential to take into account the stability of his/her condition. The chronological age of the patient was not part of the selection criteria. Instead, the physiological age and functional state were evaluated. The likely ease of tracheal intubation was always assessed. If the patient had a short neck, prominent tongue, limited ability to open the mouth, micrognathia or morbid obesity, he/she was excluded from the study.

The patients had to be able to understand and follow instructions, and had to be accompanied by a responsible person who would transport them back home and supervise them during the first postoperative day. They had to have a telephone at home and a travelling time to hospital of less than 60 min. Preoperative written instructions were always provided and written informed consent was obtained from all candidates.

Anaesthetic technique

Ondansetron was used for the prevention of postoperative nausea and vomiting; 4 mg being diluted with 100 ml 0.9% sodium chloride solution and administered intravenously over 20 min before the start of surgery. Premedication was not routinely used. In the operating room standard monitoring was established. After administration of atropine 0.5 mg iv, general anaesthesia was induced with propofol 2 mg kg^{-1}. The trachea was intubated with a microlaryngeal tube with cuff after intravenous administration of vecuronium 0.1 mg kg^{-1}. Anaesthesia was maintained with a propofol infusion at 10 mg kg^{-1} h^{-1} and air in 40% oxygen. The lungs were mechanically ventilated to control end tidal carbon dioxide between 35 and 40 mm Hg. Alfentanil was given to obtain analgesia at a dose of 10–15 mg kg^{-1}. Methylprednisolone 1 mg kg^{-1} iv was routinely given. Before extubation of the trachea, neuromuscular paralysis was reversed using neostigmine 0.05 mg kg^{-1} and atropine 0.01mg kg^{-1}. Postoperative analgesia was achieved with metamizol 2 g iv. Tramadol 1 mg kg^{-1} iv was used in patients with intolerance or allergy to metamizol, or in case the analgesia was insufficient.

Surgical technique

Surgery was performed in the Boyce-Jackson position using the Kleinsasser laryngoscope, which was introduced and positioned with a suspension apparatus. The endolaryngeal structures were visualized with a binocular microscope through a 400 mm lens.

Discharge criteria

Patients were transferred to the recovery room, where they stayed at least 1 h with a score of 10 on the conventional Aldrete score. After that period of time and in the absence of complications (bronchospasm, laryngospasm, pain, nausea or vomiting) they were moved to the day hospital for further observation. Discharge home was planned after a minimum of 5 h postoperatively, when they were oriented and apyrexial, had stable vital signs, spontaneous diuresis and tolerance of oral fluids. Clear fluids were offered in small quantities no sooner than 2 h after arrival in the day hospital. Clinical symptoms or signs of laryngospasm, bronchospasm, nausea, vomiting, pain, sleeplessness or instability on walking had to be completely absent. Before discharge, an oropharynx direct visualization and an indirect laryngoscopy or fibroscopy were performed in every patient in order to rule out the presence of a haematoma and/or oedema. If the patients did not fulfil all the previous criteria, or required medical or nursing care after 10.00 pm, they were admitted to the hospital overnight.

Postoperative control

Verbal and written advice regarding postoperative home care were given, pointing out the telephone number where they could contact the anaesthetist on-call 24 h a day. Patients received clinical information about the procedure that included the date and hour when they had to be re-examined by the surgeon (normally 7 days after the operation). They also received sufficient oral medication for pain relief during the first 24 h. A nurse telephoned the patient 12 and 24 h after the operation to enquire about any postoperative complications.

Cost analysis

According to the data registered by the Admission and Clinical Documentation Department we calculated the average length of stay of the patients that underwent MLS on an inpatient basis. The average cost of stay per day in the hospital and in the day hospital was calculated, including nurse and auxiliary personnel salaries, accommodation, dressings, drugs and general material costs. We excluded surgery and anaesthetist ambulatory consulting costs, operating room costs and costs from other departments (laboratory, radiology, emergency, admission, clinical documentation and others), because our ambulatory programme is totally integrated.

Results

Following the previous criteria 22 adult patients (19 men and 3 women) were scheduled for MLS under general anaesthesia between February and September 1995. The age of patients ranged from 20–74 yr (49 ± 16 yr, mean ± SD). Thirteen patients were ASA I, eight

Table 1. Patient data (n = 22)

Sex	*Age*	*Preoperative diagnosis*	*Pathology*	*ASA*	*Associated diseases*	*OT*	*PACU*	*DH*	*Complications*	*Outcome*
F	64	Vocal cord polyp	Polyp	II	COPD	30	90	7	Mild laryngospasm	Discharge
F	30	Vocal cord polyp	Polyp	I	–	20	60	4	–	Discharge
M	20	Vocal cord polyp	Polyp	I	–	30	85	6.5	–	Discharge
M	74	Chronic laryngitis	Epidermoid carcinoma	II	COPD, AHT	90	240	2.5	Moderate laryngospasm	Discharge
M	64	Chronic laryngitis	Leucokeratosis	I	–	40	60	4	–	Discharge
M	58	Laryngeal neoplasm	Epidermoid carcinoma	II	COPD	45	90	3.5	–	Discharge
M	47	Laryngeal neoplasm	Epidermoid carcinoma	I	–	60	85	5	–	Discharge
M	57	Intracordal cyst	Ductal cyst	I	–	60	75	7.5	–	Discharge
M	20	Vocal cord polyp	Polyp	I	–	30	90	6.25	–	Discharge
M	40	Vocal cord polyp	Polyp	II	AHT	25	75	6.25	–	Discharge
M	60	Oedematous laryngitis	Chronic inflammation	I	–	35	60	4.5	–	Discharge
M	51	Laryngeal neoplasm	Epidermoid carcinoma	II	COPD	10	75	6	–	Discharge
M	30	Laryngeal neoplasm	Keratosis	I	–	35	60	5.5	–	Discharge
M	68	Laryngeal neoplasm	Epidermoid carcinoma	II	Aortic stenosis	60	60	8	–	Discharge
F	34	Vocal cord polyp	Mucous cyst	I	–	28	60	5.5	–	Discharge
M	48	Laryngeal neoplasm	Epidermoid carcinoma	II	COPD, alcoholism	30	60	6.5	–	Discharge
M	59	Vocal cord polyp	Polyp	I	–	35	60	5	–	Discharge
M	44	Vocal cord polyp	Polyp	I	–	30	60	5	–	Discharge
M	30	Vocal cord polyp	Polyp	I	–	15	60	7	–	Discharge
M	63	Laryngeal neoplasm	Papillomatosis	II	COPD, AHT	20	60	5	–	Discharge
M	71	Laryngeal neoplasm	Epidermoid carcinoma	III	COPD	35	240	–	Laryngo-bronchospasm	Admission
M	43	Chronic laryngitis	Chronic inflammation	I	–	25	75	5	–	Discharge

F, female; M, male; ASA, American Society of Anesthesiologists physical status classification; COPD, chronic obstructive pulmonary disease; AHT, arterial hypertension; OT, operative time (min); PACU, postoperative care unit stay (min); DH, day hospital stay (h).

patients were ASA II and one patient was ASA III. Detailed demographic data, length of operation, postoperative care unit stay, complications and outcome of every patient are shown in Table 1. Biopsies accounted for the majority of the cases (54%), followed by polypectomy (41%) and cyst excision (5%). Mean length of the procedure was 36 min (range 10–90 min), mean postoperative care unit stay was 85 min (range 60–240 min) and mean stay in the day hospital was 5.5 h (range 2.5–8 h).

Twenty-one patients (95%) were discharged home the same day of the procedure. Two had mild or moderate laryngospasm after extubation of the trachea in the operating room that disappeared after a few minutes with oxygen via face mask. No other complications were seen in the immediate postoperative course. They were all interviewed by telephone 12 and 24 h after the operation. Only two suffered from a mild sore throat and another two from a mild headache that gradually disappeared with the oral analgesic. No patients had to phone back to the hospital, come to the emergency unit, or be admitted to the hospital.

One ASA III patient (5%) presented with severe laryngospasm in the operating room, followed by bronchospasm in the recovery room in combination with delayed recovery. He was kept in the hospital overnight and discharged home the following morning, having not presented with further complications.

Microlaryngeal surgery for polypectomies or biopsies, performed as an inpatient procedure, had an average stay of 1.9 days at a cost of 12 826 pesetas per day in our hospital. One day's stay in our day hospital cost an average of 15 346 pesetas. This represents a total saving of 9023 pesetas per case.

Postoperative satisfaction was complete in 97% of the patients, who would choose an ambulatory procedure a second time.

Discussion

Microlaryngeal surgery is generally performed on an inpatient basis. Robinson[6] reported a series of 294 patients requiring direct laryngoscopy or MLS. They were all admitted to hospital and observed for at least one night postoperatively. In 98% of the patients the postoperative course was entirely uncomplicated, four patients developed a non-fatal complication and one died of myocardial infarction. The study concluded that significant postoperative complications after MLS are rare. Based on this data we analysed the possibility of moving selected patients to the outpatient setting.

Indications for MLS are clinical diagnosis and treatment of several laryngeal diseases. These include a variety of malignant tumours and premalignant and benign lesions, such as vocal fold nodules, laryngeal microwebs, laryngeal cysts, airway granulation tissue, Reincke's oedema, papillomatosis, granulomas and haemangiomas. Some of these lesions may jeopardize the management of the airway when excised, caused by massive oedema or haemorrhage, which could occur with large masses or subglottic tissues. We considered that these lesions should not be dealt with on an outpatient basis. Nevertheless, our results suggest that polyp or cyst excision and biopsies of small lesions of the larynx can be safely carried out on an ambulatory basis if the patients are properly selected. In fact many of these procedures are performed under general anaesthesia, not because of the nature of the lesion, but because of its inaccessibility with other techniques or because of the discomfort of the patient.

We believe that in this type of surgery it is important to select candidates with a good physical status to avoid substantial risks. In this regard 95% of our patients were ASA I or II. The postoperative course in the majority of them was uneventful, except in two patients who developed laryngospasm immediately after extubation of the trachea that reversed after a few minutes. Routine prescription of corticoids before MLS to avoid this complication is not necessary, but is recommended when the operation is expected to last more than 30 min[8]. The only ASA III patient presented the most severe complications, suggesting that a large number of cases need to be studied before considering patients in this physical status as appropriate candidates.

No significant complications were observed after discharge from the recovery room in any patient, including the one who was admitted to the hospital. Although the mean stay in the postoperative care unit was 85 min, two patients stayed for up to 4 h. This suggests that the minimum postoperative observation time should be at least 4 h.

The low number of patients included in spite of the period of the study (8 months) was due to the routine performance of the procedure under topical anaesthesia with a flexible fibroscope[7]. When this technique was not successful the patient was scheduled for MLS. Other reports should confirm the suitability of performing MLS on a day case basis.

Our saving represents 37% per case over the inpatient cost and assures optimal use of inpatient beds and an earlier return to work for the patients.

In conclusion, microlaryngeal surgery under general anaesthesia to remove or perform biopsies on small lesions of the larynx and hypopharynx can be carried out safely on an outpatient basis, provided the patient has no significant systemic disease or an unfavourable social situation.

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Quality assessment in a day surgery unit

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The aim of this study was to assess the quality of day surgery by examining the experiences of patients to ascertain where and how quality can be improved. Therefore interviews were carried out with 39 patients at the University Hospital in Maastricht. These interviews were compiled using a model for quality assessment of day surgery developed by the National Organisation for Quality in Hospitals in the Netherlands. Results show that patients are satisfied with the quality of day surgery. Nevertheless it appeared that improvements could be made in the fields of: information disclosure, continuity of care from the day surgery unit (DSU) to the emergency department, pain medication for some procedures and facilities for patients at home.

Key words: Quality assessment, day surgery, information disclosure, continuity of care, pain medication

Introduction

There has been a growing interest in quality in healthcare over the past years. During the 1960s the main concern was with the control of developments in healthcare; the effectiveness of medicine and care was of central importance, rather than financial control. The standardization of practice is an important 'product' of this period, which contributed to the control of the growth in healthcare. Such standards made it possible to judge medical practice more accurately and a start was made on an internal quality-assurance system[1].

During the 1970s quality of care became of increasing interest as a result of new medical technology and medicines. Questions about the contribution of these developments to the quality of care arose[2].

In the 1980s financial resources became restricted and this led to growing concerns about quality. This was because a restriction of resources could endanger the quality of care and because an absence of quality standards might imply that funds were not being adequately used[3]. This restriction in resources has also led to an increase in day surgery, which brings us to the growing importance of quality assessment in day surgery and the reasons for its pre-eminence. First, there is a tendency towards carrying out more complex clinical procedures which are more demanding for patients, and therefore ensuring a high standard of care is especially important. Second, because of the shorter period of time that patients are under supervision in day surgery units (DSUs) and the resulting increase in responsibilities for the patient that this entails, the organization and execution of day surgery demands high standards of quality[4]. Finally, next year will see the introduction of a quality bill for healthcare institutions in the Netherlands. This bill will make it a necessity that all institutions are able to provide annual reports to the authorities which demonstrate that they provide their care in a qualitatively responsible way[5]. This clearly implies the need for adequate quality assessment and continuous quality improvement.

Whereas the study covered the viewpoint of surgeons, anaesthetists and nurses, its chief aim was to assess the quality of day surgery from the patients' perspective. It is this perspective that will be the focus of this study, which assessed quality using the following problem thesis: what is the experience of patients and care-providers regarding the quality of day surgery, and what measures can be taken to bring about improvements?

Methods

Day surgery was assessed using questionnaires in order to identify the strong and weak aspects of the care provided. These questionnaires were compiled using most of the items of a model for quality assessment of day surgery as proposed by the National Organisation for Quality in Hospitals in the Netherlands (Table 1).

This model gives hospitals the opportunity to analyse their day-care facilities with regard to various aspects of

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Table 1. Model for quality of day surgery

Patient capability	Impact
Patient	Surgical procedures
Physical status	Physical impact
Psychosocial status	Psychological impact
Facilities at home	Preoperative estimation of complications
Attendance and care at home	
	Health care providers
	Competence
	Attitude
	Availability
	Continuity
	Effectiveness
	Carefulness
	Safety
	Organization
	Accessibility
	Integral care
	Provision of information and instructions
	Efficiency

quality and to describe the desired situation[6]. All these aspects were assessed except those under the surgical procedure heading. Tables 2, 3 and 4 show some of the questions which were used to assess the aspects outlined in the model.

After giving consent, patients were interviewed three times: in the morning before the operation, just before discharge from the DSU and 1 week after surgery at the outpatients department.

Results

In 1993, 825 patients were admitted to the day care unit at the university hospital of Maastricht. Of these patients, 242 were under the care of the surgical department. The interviews in this study were carried out over a period of 3 months and provided a sample of 39 patients. Of these, only two patients were interviewed the morning before the operation because they did not undergo surgery as a result of hypertension and were sent home. There were also two patients who did not keep their appointments at the outpatients department and therefore a total of 35 patients were interviewed three times.

In addition to the results given in Tables 2, 3 and 4, the following results can also be reported:

Before the operation at the DSU (n=39)

The accessibility of the DSU was good, 56% of the patients (22 out of 39) considered the time spent on the waiting list to be satisfactory. This time was, on average, 7 weeks. The preoperative information was found to be inadequate by almost half of the patients, concerning both anaesthesia (49%; 19 out of 39) and surgery (46%; 18 out of 39). Patients mentioned worries about things such as: how big will the scar be; where will the incision be; what can and cannot be done after the operation and the period of time off work required. Furthermore, it appeared that 8% of the patients (three out of 39) did not have any previously arranged home care for the first 24 h after the operation. This was mainly as a result of a lack of information about the necessity of care at home and, in consequence, an underestimation of the impact of the operation.

As already mentioned, two of the patients had to be sent home because of hypertension. This illustrates an

Table 2. Before operation at the DSU (*n*=39)

Experienced waiting time between visiting outpatients department and intake at the DSU i.e. accessibility	too long: sufficient: too short:	41% 56% 3%
Patients who had heard of day surgery before their own intake	yes: no: 41% of the patients had had surgery before at the DSU	74% 26%
Patients who found the information about the surgery sufficient? i.e. provision of information and instructions	yes: no:	54% 46%
Patients who found information about anaesthesia sufficient? i.e. provision of information and instructions	yes: no:	51% 49%
Transport home arranged? i.e. attendance and care at home	yes: no:	95% 5%
Is care at home available for the first 24 h after the operation? i.e. attendance and care at home	yes: no:	92% 8%

Table 3. Just before discharge from the DSU (n=37)

Attitude of nurses i.e. attitude	good: sufficient: insufficient:	97% 3% 0%
Availability of nurses i.e. availability	good: sufficient: insufficient:	100% 0% 0%
Attitude of surgeons i.e. attitude	good: sufficient: insufficient:	60% 24% 16%
Availability of surgeons i.e. availability	good: sufficient: insufficient:	68% 19% 13%
Looking back, was the information about the operation sufficient? i.e. provision of information and instructions	yes: no:	73% 27%
Looking back was the information about the anaesthesia sufficient? i.e. provision of information and instructions	yes: no:	84% 16%
Pain experienced? i.e. physical status	none: a little: reasonable: quite a lot: a lot:	22% 35% 19% 19% 5%
Nausea experienced? i.e. physical status	yes: no:	16% 84%
Is the information about postoperative life rules clear? i.e. provision of information and instructions	yes: no:	80% 20%
What would you choose if similar treatment was required again? i.e. effectiveness	day surgery: in-hospital treatment:	89% 11%

Table 4. 1 week after operation at the outpatients department (n=35)

Was care available at home for the first 24 h after the operation? i.e. attendance and care at home	yes: no:	86% 14%
Pain at home? i.e. physical status	yes: no: 14 patients did not take the prescribed pain medication	40% 60%
Nausea at home? i.e. physical status	yes: no:	17% 83%
Was the information about the postoperative life rules sufficient? i.e. provision of information and instructions	yes: no:	77% 23%
What would you advise other people who needed similar treatment to do? i.e. effectiveness	day surgery: in-hospital treatment:	89% 11%
Have you had contact with the hospital after your discharge from the DSU? i.e. continuity	yes: no:	6% 94%

area of inefficiency in day surgery care which could be improved by better preoperative screening.

At the time of discharge from the DSU (n=37)

The patients were very satisfied with the attitude and availability of nurses, but satisfaction was lower and in some cases insufficient with regard to the attitude and availability of surgeons and anaesthetists. Patients complained that the time available for questions to and explanations from surgeons and anaesthetists was insufficient. Furthermore, it also appeared that the surgeon/anaesthetist would sometimes make his/her visit when the patient was still asleep. Similar reasons were also given by patients who complained about the lack of information regarding the surgical procedure (27%; 10 out of 37) and anaesthesia (16%; six out of 37) provided during the day.

Concerning the physical status of the patients, the results showed that upon discharge 43% of the patients (16 out of 37) complained of reasonable to severe pain and 16% (six out of 37) of nausea. Apart from pain around the scar (12 out of 37), two of the patients also experienced pain in the throat and two had a headache.

Postoperative information appeared to be inadequate for 20% of the patients (15 out of 37) at the time of discharge. Patients appeared not to have had enough information about practical things, such as what to do with the plasters/bandages; showering; walking and returning to work.

After 1 week at the outpatient department (n=35)

It appeared that 14% of the patients (five out of 35) did not have any home care for the first 24 h after the surgery. This was due to a lack of information which meant that either home care was not arranged or patients thought they did not need any care at home.

At home, 40% of the patients still experienced severe pain. It appeared that 14 patients did not consider their prescribed pain medication necessary.

Regarding the continuity of care, two out of the 37 who underwent surgery had to visit the emergency department on the evening of their operation because of haemorrhage. These patients complained about the lack of available information on their treatment at this department. This suggests that there is insufficient information transfer from the DSU to the emergency department. Neither of the patients had to be readmitted.

The effectiveness of the surgery in day care was rated as reasonable by the patients; 89% (31 out of 35) would choose day surgery if similar treatment was required again. Remarkably, all of those patients who underwent inguinal hernia repair felt that their stay under professional care at the DSU was too short considering the pain that such surgery involves.

Recommendations

In general, it can be said that day surgery in the unit is carried out with a relatively high level of patient satisfaction, but work in the following areas could lead to further improvements at the unit:

Concerning the patients

More effective pain medication for procedures that are more demanding on the patient, such as inguinal hernia repair, can contribute to a higher quality of care.

Concerning the healthcare providers

Better continuity of care. There is a need for better information transfer from the DSU to the emergency department; this could be attained by using forms which contain specific information about the anaesthesia and surgery for every patient.

Concerning the organization

The information disclosure to the patients could be improved by, for example, providing more information through the nursing team, whose attitude and availability were considered outstanding. This could be facilitated by giving instruction and clinical lessons to the nursing team. Furthermore, additional information on clinical procedures could be provided through explanatory leaflets or a video presentation on day surgery, and it should include information about the necessity of home care after the operation.

Conclusion

Quality assessment is essential in today's medical institutions. This study shows that, with a balanced questionnaire, it is possible to evaluate and improve the quality of day surgery and of day care in general. A list of standard questions can and should be developed in order to assess quality in day care and, where necessary, improve its effectiveness and efficiency.

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The efficacy of postoperative pain management with ketorolac for day case oral surgery

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The efficacy of the non-steroidal anti-inflammatory analgesic, ketorolac (Toradol), was investigated in 52 day case patients undergoing removal of impacted third molar teeth under intravenous sedation and local analgesia. The study was double-blind, randomized and placebo-controlled. A single 30 mg dose of ketorolac was administered intravenously just prior to induction of sedation with midazolam. Ketorolac was well tolerated and provided good postoperative analgesia. It is suggested that ketorolac is a useful addition to the analgesic armamentarium and appropriately prescribed, provides good pain relief following day case oral surgery.

Key words: Analgesia, postoperative, ketorolac, oral surgery, day case surgery

Introduction

Pain following the surgical removal of third molar teeth may be severe and a common cause of anxiety in patients about to undergo such a procedure[1]. This pain may be reduced by giving a non-steroidal anti-inflammatory drug (NSAID), paracetamol, an opioid or a combination of these. Paracetamol, however, is inadequate for the control of severe pain[2,3], and the respiratory depression caused by the potent opioid analgesics makes them unsuitable for outpatient use and for use in those patients requiring intravenous sedation[4–6]. Although NSAIDs are ideal for dental postoperative pain[7,8], which is largely inflammatory in origin, they have limited use in the control of severe rather than mild or moderate pain[1,9].

The objective of this study was to assess the efficacy and safety of intravenous (iv) ketorolac trometamol (Torodol) in day case patients undergoing surgical removal of an impacted third molar tooth under local anaesthesia and iv sedation. The study was double-blind, randomized and placebo-controlled. Ketorolac is a NSAID described as having potent analgesic and moderate anti-inflammatory activity[10]. It inhibits the cyclo-oxygenase pathway of arachidonic acid metabolism, resulting in the inhibition of prostaglandin biosynthesis, and is considered to be a peripherally acting analgesic. It does not appear to have effects on opiate receptors[11,12].

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Methods

Fifty-two patients who required removal of an impacted lower third molar, with bone removal and tooth division, and who might also have required extraction of an upper ipsilateral third molar, were entered into the study. Patients were aged 18–65 yr, weighed between 50 and 100 kg and were in general good health. The main exclusion criteria were: pregnancy or lactation; clinically significant co-existing disease or history of gastric or duodenal ulcer; history of drug or alcohol abuse; and recent or concomitant use of medication likely to interfere with the study drug or its assessment. All patients entering the study gave written informed consent prior to its commencement and ethics committee approval of the protocol was obtained.

The study was blinded by means of a placebo solution which was identical to the active medication except for the absence of ketorolac. All packaging was identical with only the patient's number as an identifier. Whether the medication assigned to a given patient number was active or placebo was determined according to a computer-generated randomization code. Patients were assigned their study numbers sequentially as they entered the study. The ketorolac intravenous (iv) solution was supplied as 30 mg ml^{-1} doses in amber ampoules. All treatments were carried out by the same operator and all assessments by a single research nurse.

The patient was placed in the supine position and the ketorolac or placebo administered by slow (30 mg over 15 s) bolus injection via an indwelling cannula in the dorsum of the hand. This was immediately followed by induction of sedation with the 2 mg ml^{-1} preparation of iv midazolam (Hypnovel). The latter was titrated slowly, via the same cannula, to the desired sedation endpoint, but not exceeding 10 mg. Local anaesthesia was induced with prilocaine 4% solution without vasoconstrictor and was therefore shorter acting. The time at which the study medication was administered, the dose of midazolam administered and the times at which surgery started and ended were recorded. At tooth division the intraoperative pain was assessed by the patient according to the verbal rating scale (VRS): none, mild, moderate or severe. At the end of surgery a note was made of whether or not the patient suffered any excessive bleeding or any other adverse event.

Immediately after the completion of surgery, the first postoperative pain assessment was made as a baseline measure. The pain assessments were made by means of a 100 mm visual analogue scale (VAS) and a VRS. The VAS was marked at one end "I have no pain" and at the other, "the worst pain imaginable". The VRS was presented as: none, mild, moderate and severe. Further assessments were made every 15 min until 2 h after baseline and then at 2 h 30 min and finally at 3 h after baseline. Postoperative analgesia, if required, was ibuprofen, 200 mg tablets, the dosage being 400 mg. The time at which any patient requested and took the escape analgesia was recorded.

Shortly before the patient was discharged from hospital, the patient and the investigator made global assessments of the study therapy. Global assessments of the efficacy and tolerability of the medication, and the quality of the sedation, were made by means of the VRS: poor, satisfactory or excellent.

Safety was evaluated by continuous recording by automatic sphygmomanometer and pulse oximeter of blood pressure, pulse rate and arterial oxygen saturation. Any clinically significant deviations in any of these parameters was recorded as an adverse event. Patients were asked for symptomatic complaints using indirect questioning at each assessment. A phase such as "is anything other than the surgery pain bothering you?" was used. All symptoms were recorded as adverse events, whether or not deemed to be causally associated with the study medication. The time of discharge was recorded and the reason for any delay in discharging the patient was noted. At follow-up, 15 days after surgery, the patient was questioned about any adverse events which may have occurred since the end of the study. At this time the patient also made a final global assessment of the study therapy.

Results

All 52 patients who were recruited into the study received the study drug, and all were included in both the efficacy and safety analyses. Twenty-six patients were randomized to receive ketorolac and 26 to receive placebo. Statistical analysis was performed using SAS (production release for Windows). All significance tests were two-tailed and carried out at the 5% level. All summaries of data were by treatment group.

Demographic details are shown in Table 1. The dose of midazolam ranged from 4 to 9 mg in the ketorolac group and from 4 to 10 mg in the placebo group. Mean midazolam doses were 7 mg and 6.8 mg in the ketorolac and placebo groups, respectively. All patients received 4.4 ml of prilocaine for the removal of the lower third molar and 2.2 ml for the extraction of the upper, if this was carried out. The mean duration of surgery was 11.5 min in the ketorolac group and 9.9 min in the placebo group. The overall duration ranged from 8 to 23 min. No excessive bleeding was reported during surgery.

Efficacy

Intraoperative pain severity. Fifteen patients in the ketorolac group (58%) and 16 (62%) in the placebo group reported no intraoperative pain. Of those who did report pain, 10 patients reported it as mild and one as moderate in the ketorolac group and eight reported mild and two moderate pain in the placebo group. In neither treatment group was severe pain reported. The difference between the treatment groups was small and not statistically significant.

Postoperative VAS pain scores. The primary efficacy variable is the area under the curve (AUC) of the postoperative pain assessments measured using a VAS. AUCs are summarized by presenting the median and range for each treatment in Table 2. The study protocol stated that pain assessments need not be continued after a patient had taken postoperative analgesia. However, patients who did take postoperative analgesia carried on with the assessments of pain until 3 h after the baseline assessment with the exception of only a few missing assessments. In order to accommodate these additional data, the AUCs were calculated in two different ways. In the first method, only the missing assessments were substituted using the last observation carried forward (LOCF) method. Assessments made after a patient had taken postoperative analgesia were analysed as if the analgesia had not been taken. In the second method, assessments made after a patient had taken postoperative analgesia were assumed to be missing, and all missing assessments were substituted (using the LOCF

Table 1. Demographic details of study patients

	Ketorolac	Placebo	Overall
No. of patients	26	26	52
Male	7 (27%)	6 (23%)	13 (25%)
Female	19 (73%)	20 (77%)	39 (75%)
Mean age	26.8	26.8	26.8
Mean weight	68.2	63.0	65.6

Table 2. The areas under the VAS curves assessing 3 h of postoperative pain

	Ketorolac	*Placebo*
No. of patients	26	26
Using substitution for missing data only		
Median	1.1	6.1
Range	0.0–37.0	0.3–27.1
Treatment comparison*	$P = 0.005$	
Using substitution for missing data and for data recorded after first use of escape analgesia:		
Median	1.1	9.4
Range	0.0–32.3	0.1–59.0
Treatment comparison*	$P = 0.004$	

* By Wilcoxon rank sum test.

method). Using the substitution for missing data method, the median standardized AUC was 1.1 in the ketorolac group compared with 6.1 in the placebo group. The smaller values indicate less overall pain. The difference between treatment groups tested using the Wilcoxon rank sum test achieved statistical significance ($P = 0.005$). Using substitution for missing data and data recorded after the first use of postoperative analgesia, the median standardized AUCs were 1.1 and 9.4 in the ketorolac and placebo groups, respectively. Again the treatment difference was statistically significant ($P = 0.004$).

Postoperative VRS scores. Maximum VRS pain assessments are summarized in Table 3. Using substitution for missing data only, 46% of patients in the ketorolac group reported some pain and 15% reported moderate or severe pain. In the placebo group 85% of patients reported some pain and 50% reported moderate or severe pain. The treatment difference was statistically significant ($P = 0.004$). Using substitution for missing data and data recorded after the first use of postoperative analgesia, 46% of patients in the ketorolac group reported some pain and 12% reported moderate or severe pain. In the placebo group 77% of patients reported some pain and 46% reported moderate or severe pain. The treatment difference achieved statistical significance ($P = 0.003$).

Time to first postoperative analgesia. The time to first postoperative analgesia is summarized in Table 4 and Figure 1. All patients took ibuprofen only. Twenty-five per cent of ketorolac patients took postoperative analgesia in the 3 h study period, compared with 72% of patients in the placebo group. None of the patients in the ketorolac group had taken postoperative analgesia up to 1 h 45 min from baseline, compared with 10 (40%) in the placebo group. The estimated times at which 50% of patients had taken analgesia using the Kaplan–Meier method were 235 min and 125 min in the ketorolac and patient groups, respectively. The difference between treatments using the generalized Wilcoxon test was statistically significant ($P < 0.001$).

Time to hospital discharge. The mean time to hospital discharge was 185 min and 184.5 min for the ketorolac and placebo groups, respectively.

Table 3. Maximum VRS for 3 h of postoperative pain

	Ketorolac	*Placebo*
No. of patients	26	26
Using substitution for missing data only		
None	14 (54%)	4 (15%)
Mild	8 (31%)	9 (35%)
Moderate	2 (8%)	11 (42%)
Severe	2 (8%)	2 (8%)
Treatment comparison*	$P = 0.004$	
Using substitution for missing data and for data recorded after first use of escape analgesia:		
None	14 (54%)	6 (23%)
Mild	9 (35%)	8 (31%)
Moderate	3 (12%)	11 (42%)
Severe	0	1 (4%)
Treatment comparison*	$P = 0.003$	

* By Wilcoxon rank sum test.

Table 4. Time to first postoperative analgesia

	Ketorolac	*Placebo*
No. of patients	26	26
No. who required postoperative analgesia within 3 h	6 (24%)	18 (69%)
Estimated time* (min) by which:		
25% of patients required analgesia	205	77
50% of patients required analgesia	235	125
75% of patients required analgesia	300	182
Treatment comparison†	$P < 0.001$	

* By Kaplan–Meier
† By generalized Wilcoxon

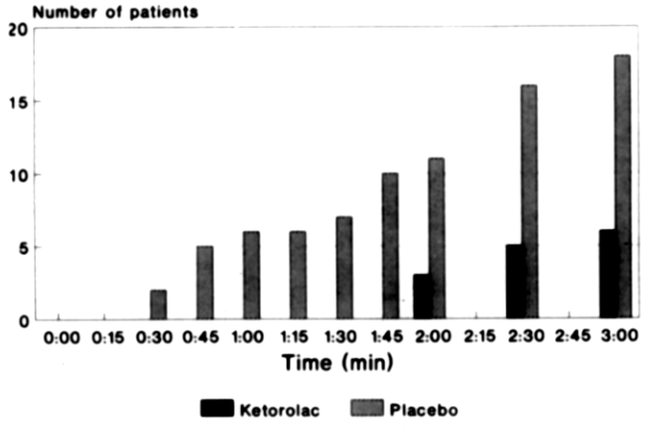

Figure 1. Number of patients who had taken analgesia by each postoperative pain assessment

Global assessment of intraoperative analgesia. In both treatment groups the investigators assessment was 'satisfactory' or 'excellent' for almost all patients, and approximately 90% of the patients' assessments at discharge and follow-up were rated 'excellent'. There was no statistically significant difference between groups.

Global assessment of intraoperative sedation. The assessment by the investigator at discharge, and assessments by the patient at both discharge and follow-up were 'excellent' for almost all patients, and showed no statistically significant difference between treatment groups.

Global assessment of postoperative analgesia. At hospital discharge the investigator rated postoperative analgesia as excellent in 75% of the ketorolac group compared with 46% of the placebo group. The treatment difference was statistically significant ($P = 0.041$). At hospital discharge 80% of patients in the ketorolac group rated postoperative analgesia as excellent compared with 50% in the placebo group. However, at follow-up the treatment difference no longer achieved statistical significance, with 72% of ketorolac patients and 54% of placebo patients giving a rating of excellent.

Safety

Adverse events. A total of 12 ketorolac patients reported 14 adverse events and 13 placebo patients reported a total of 14 adverse events. The most frequently reported adverse event was injection site pain at the time of injection, recorded 11 times in the ketorolac group and 12 times in the placebo group. This pain was not severe enough to prevent completion of injection in any patient, although the slow bolus may have been slowed still further.

There were no clinically significant changes in pulse rate, blood pressure or arterial oxygen saturation in any patient during the study. Syncope was reported by two patients in the placebo group and there was one report of constipation, at follow-up, in the ketorolac group.

Discussion

The two treatment groups were very similar. Approximately 75% of all patients were female, with no co-existing diseases. Surgery details for the two treatment groups were also similar. All patients received an identical dose of prilocaine and the mean dose of midazolam in the two treatment groups was similar (ketorolac 3.5 ml, placebo 3.4 ml). The duration of surgery was slightly longer in the ketorolac group compared to the placebo group (mean 11.5 min compared to 9.9 min) but there was no excessive bleeding in either group or any statistically significant difference in the patients' intraoperative pain.

Efficacy

There were clear treatment differences between the groups regarding postoperative pain assessed by VAS or VRS. The VAS assessments yielded median AUC values of 1.1 in the ketorolac group compared to 9.9 in the placebo group, and this difference was statistically significant ($P = 0.004$). The VRS assessment of postoperative pain also favoured ketorolac. Fewer ketorolac patients than placebo patients reported any pain (46% compared to 85%), and for only 15% of ketorolac patients was the maximum pain severity reported mod-

erate or severe, compared to 50% on placebo. Again this treatment difference was statistically significant ($P = 0.004$).

Twenty-five per cent of ketorolac patients took postoperative analgesia during the study, compared to 72% of placebo patients. Also, the estimated times by which each group had taken a first dose were statistically significantly longer in the ketorolac group ($P = 0.001$).

The global assessments of postoperative analgesia also favoured ketorolac, particularly at discharge, when both the patients' and the investigators' assessments were statistically significantly better for ketorolac than for placebo ($P = 0.027$ and $P = 0.041$, respectively).

Safety

Adverse events reported during the study were similar in the two treatment groups. Injection site pain was the only prominent adverse event. As it was equally common in both treatment groups, it is possible that the injection site pain was caused by some constituent of the vehicle. This adverse event has not been reported in other studies and may have come to light because the small veins on the dorsum of the hand were used for injection in this study.

Conclusion

Administration of a single, preoperative, 30 mg dose of iv ketorolac significantly reduces the postoperative pain experienced by patients undergoing removal of impacted third molar teeth under local anaesthesia and intravenous sedation, as assessed by VAS and VRS. The number of patients requiring postoperative analgesia is reduced and the estimated time when it is first taken is statistically significantly longer in patients who received 30 mg iv ketorolac preoperatively. Intravenous ketorolac was very well tolerated by the study population.

In common with other NSAIDs, ketorolac should not be used in patients with a history of peptic ulceration or gastrointestinal bleeding, a history of haemorrhagic diathesis, a history of asthma or a known sensitivity to NSAIDs or aspirin. Furthermore, it should not be used during pregnancy or lactation, or concomitantly with other NSAIDs or anticoagulants[12,13]. Since this study, the recommended starting dose for parenteral administration has been reduced to 10 mg with subsequent doses of 10–30 mg every 4–6 hr as required[14]. It is suggested that ketorolac is a useful addition to the analgesic armamentarium and appropriately prescribed, provides good pain relief following day case oral surgery.

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The role of oxygen therapy in the recovery phase of day surgery

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Oxygen therapy in the inpatient setting is standard practice in the postoperative phase. The aim of this study was to evaluate the need for the routine use of oxygen in the transit phase from the operating theatre to recovery, and its continued use in recovery, in patients undergoing day surgery. ASA I–II patients undergoing body surface surgery, using anaesthetic agents with a rapid recovery profile, are not subject to many of the factors that predispose to postoperative hypoxaemia. This study showed that in our unit the majority of patients do not require oxygen therapy in the theatre–recovery transit phase, and that attention to patient positioning, airway patency, and elimination of the second gas effect may be sufficient. Each day surgery unit (DSU) must make decisions on the need for postoperative oxygen therapy based on the unit layout and the condition of the patient.

Key words: Day surgery, oxygen therapy

Introduction

Oxygen therapy after inpatient surgery is standard practice in the postoperative phase. Postoperative hypoxaemia is the result of many factors: upper airway obstruction, respiratory depression, altered CO_2 sensitivity, the second gas effect, a decrease in SVo_2, decreased functional residual capacity (FRC), increased closing volume and an increase in ventilation/perfusion (V/Q) mismatching. Major surgery is associated with constant or episodic decreases in oxygen saturation over up to five nights postoperatively[1], and postoperative confusion has been found to be associated with a decreased Spo^2 postoperatively[2]. These changes are not found in patients undergoing minor surgery[3]. Most day surgery patients are ASA I, unpremedicated and are undergoing body surface surgery with anaesthetic agents of rapid recovery profile. Therefore the factors that contribute to postoperative hypoxaemia may be minimized. The routine use of oxygen therapy for day surgery patients may thus be unnecessary, particularly with the advent of pulse oximetry.

Methods

It is our standard practice not to give oxygen therapy in the theatre–recovery transit phase. One hundred patients in our day surgery unit (DSU) undergoing general anaesthesia were included in the study to re-evaluate this practice. All had a standard day case anaesthetic appropriate to their surgical operation. Details of age, sex, ASA status, smoking history, grade of anaesthetist, method of ventilation and analgesia were documented (Table 1). At the end of the procedure the patients were turned onto the lateral position and transferred to a trolley. During transfer to the recovery room, a distance of 70 m through two manually and two automatically operated doors, each patient breathed room air according to our standard practice. Airway support, state of consciousness and theatre–recovery transit time were noted. Average intraoperative Spo^2, in theatre and the first Spo^2 on arrival in recovery were recorded (Table 1). As in the study by Di Benedetto et al.[3] we chose to define an Spo^2 <94% as hypoxaemic. All patients judged as hypoxaemic on arrival in recovery were given oxygen via a face mask.

Results

Of a total of 100 patients, 60 were female and 40 were male. The ASA status of the patients was: ASA I, 92; ASA II, eight (all male). Their age ranges were: female, 4–60 yr (mean 25 yr); male, 18–80 yr (mean 42 yr). Of the total, 32 patients had therapeutic abortions, 62 body surface procedures and six intra-abdominal surgery. Eighty-three patients were anaesthetized with opiates and/or non-steroidal anti-inflammatory drugs (NSAIDs) with the possible addition of local anaesthetic agents. Seventeen patients were anaesthetized with NSAIDs and/or local anaesthetic agents only. Twenty-five of the patients were smokers. A consultant

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Table 1. Day surgery centre pulse oximetry readings

Age:
Sex: M/F
ASA Grade:
Smoker: Y/N ?Chesty: Y/N
Operation: Body surface/intra-abdominal/other (specify)
Grade of anaesthetist:
Respiration: Spontaneous/IPPV
Analgesia: Local/opiate/NSAID
Average SPo_2 during anaesthesia:
?Problem with airway at end of procedure: Y/N, if yes please specify
State on leaving theatre: Awake/drowsy/unresponsive

Last SPo_2 in theatre .....
First SPo_2 in recovery .....
Time in transit to recovery .....

Table 2. Summary of stastical analysis

Fisher's Exact Test; Rearranged table

0	6	6
90	4	94
90	10	100

2-tailed probability (by summation) =0.000054

Uncorrected x2 = 37.5 *P*<0.0001
Yates-corrected x2 = 27.80671 *P*<0.0001.

Proportion difference = 0.4
Near exact (Mee) 95% confidence interval = 0.16818 – 0.687326

anaesthetist conducted 84 of the procedures. The mean transit time between theatre and recovery was 1 min (range 20 s–2 min).

Ranges in Spo^2 in theatre were 100–93% both during the procedure and as the last measurement before leaving. The range in recovery was 99–87%. On arrival in recovery 10 patients had an Spo^2 <94%. Of these, six were unresponsive, three drowsy and one awake. Four were smokers and four had intraoperative Spo^2 <94%. Of the other 90 patients whose saturation was >94% all were either drowsy or awake (*P*<0.0001 Fisher's exact test). Three patients had a documented airway problem; one required an oropharyngeal airway, one was described as snoring and one had bronchospasm. Seven had been given opiate drugs (Fig. 1).

Discussion

Supplemental oxygen therapy seems to be administered out of habit rather than according to individual patient requirements. Whereas this use of oxygen is unlikely to harm any patient, it is probably not useful for the majority and does incur a cost penalty. It has been our observation that the placement of an oxygen mask on the patient is believed by some staff to provide a panacea cure, which then causes problems such as an obstructed airway to be overlooked. Russell and Graybea[4] showed that low Sao^2 in recovery correlated positively with patient age, body weight, ASA status, general anaesthesia and administration of large volumes of fluid. No correlation with opiates was found. The paediatric population show a greater tendency to desaturate, especially in the first 10 min postoperatively, and here the length of the procedure and not the use of opiates is important[5]. A video surveillance study in

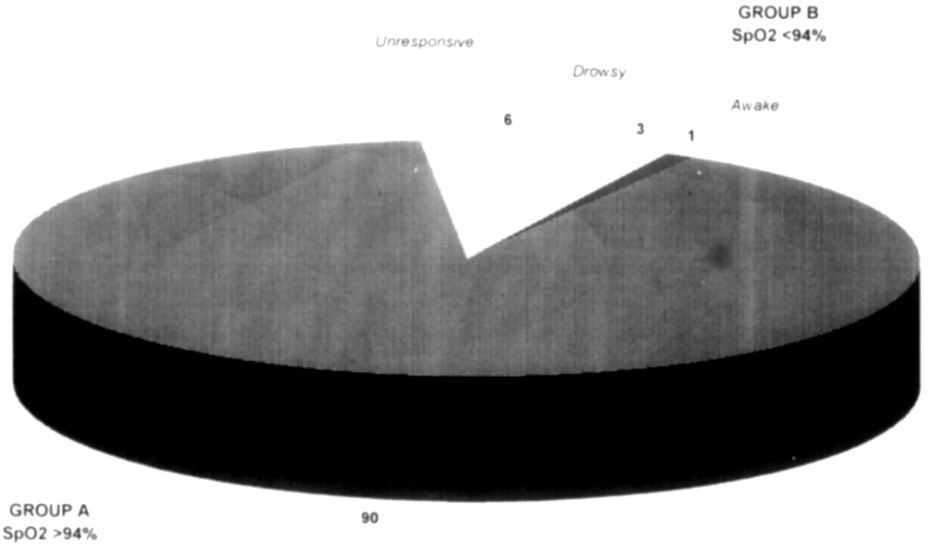

Figure 1

inpatients[6] showed how often the oxygen facemask is removed either by the patient or by the nursing staff, thus rendering the treatment intermittent at best. Many patients find oxygen masks claustrophobic and nasal spectacles uncomfortable.

Our study shows that, in the majority of patients, oxygen therapy is unnecessary in the theatre–recovery transit phase. This is in itself the most likely time for desaturation, after the patient has been transferred from operative table to trolley and is then transported, usually with no monitoring, into the recovery area. We have also identified a group of patients who are at risk of hypoxaemia, namely the unresponsive patient, and those with previous intraoperative desaturation, prior to transfer. The cause rather than the effect should be treated here, with attention to patient positioning, airway patency with or without aids, and elimination of the second gas effect by extended oxygenation in the theatre before transfer. In certain situations where the patient's condition is already optimized, oxygen may still be required for transfer, either as a result of patient factors or difficulties in a prolonged transfer, i.e. the anaesthetist being required to perform multiple tasks such as opening doors and steering the trolley as well as maintaining the airway. Pulse oximetry in this situation would alert the anaesthetist to any desaturation occurring despite oxygen therapy.

This lack of requirement for supplemental oxygen therapy may extend into the recovery phase after transit. Monitoring the Spo^2 with the aid of continuous pulse oximetry in the recovery area has been shown to reduce the incidence of episodes of desaturation[7], and so we suggest that in the day surgery setting, attention to the airway, patient positioning and continuous pulse oximetry measurement may be sufficient for most patients, to prevent hypoxaemia. This would represent not only a potential increase in patient comfort but also a cost saving by reducing the use of the disposable equipment required for the delivery of oxygen. The need for individual oxygen cylinders on trolleys, with the expense and upkeep that they entail, particularly in the high turnover environment of day surgery, would also be eliminated. We would recommend that each DSU assess its own facilities, such as transit time from theatre to recovery, usage of lifts and the case mix of patients with respect to ASA, age and type of surgery, with a view to assessing feasibility for changing the routine use of supplemental oxygen. Are we treating the patient or ourselves?

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Folly! The long distance day surgery patient

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The aims of this study were to assess the morbidity and satisfaction in long distance day surgery patients undergoing surgical intervention for male infertility. The results showed that, with a well-motivated patient group, increasing distance travelled do not cause an increase in postoperative morbidity, providing that patients receive adequate community support and information regarding their surgery, limitations on activity, potential complications and methods of analgesia.

Key words: Day surgery, long distance patients

Introduction

Guidelines for travelling time and distance from the day surgery unit (DSU) to the patient's home base is rather arbitrary (1 h and 30 km, respectively), and does not take into account the physical, intellectual and ASA status of the patient, the type of surgery performed and the community support structure as well as the type and conditions of transport. A Norwegian study[1] showed that the social situation is probably more important than the distance itself, and that patients are willing to travel 150–200 km provided that they feel that the treatment and care they receive is good enough. In fact 35% and 4.5% of patients travelled distances exceeding 100 km and 200 km, respectively, and this often involved speed boat and ferry transport. Our DSU is a tertiary referral centre for surgical intervention of male infertility. This is viewed as a low priority surgical procedure, and hospital economics preclude inpatient stay. Patients are predominantly extra-contractual referrals and are highly motivated towards day surgery for their own financial reasons. Our DSU general audit showed that the principal causes of recovery delays, which may reflect later morbidity and admissions, are haemorrhage, pain, syncope and nausea and vomiting, and are potentially resolvable with the right approach.

Methods

We reviewed all patients undergoing scrotal surgery who lived outside London postal districts over a 3-yr period. A consultant surgeon and consultant anaesthetist were regularly assigned to the list. Patients with a history of postoperative nausea and vomiting or motion sickness were given prophylactic anti-emetic therapy in accord with our unit protocol. Pain relief combined local and regional techniques with local anaesthetic agents and non-steroidal anti-inflammatory drugs (NSAIDs). We sent out patient questionnaires focusing on morbidity and patient satisfaction.

Patients were specifically questioned on problems with nausea, vomiting and pain prior to discharge from the DSU and during the journey home. The distances travelled by the patients and their mode of transport were ascertained, and their opinion as to the influence of journey length on the nausea and pain. Any difficulties recruiting an escort were also enquired after. Analgesic requirements in this group of patients were correlated with a group of patients from our general day surgery audit. Availability and usage of professional help postoperatively at home were included in the questionnaire.

Results

One hundred and ten questionnaires were sent out and 59 patients replied, either by returning the questionnaire or by telephone follow-up. A higher response rate was not achieved for several reasons; the retrospective nature of the study over a 3-yr period meant that some patients had moved, some phone numbers were ex-directory or disconnected, and the incorrect address may have been entered on the patient's file.

All patients had travelled for over the 1 h recommended in day surgery guidelines. Only five had problems recruiting an escort for the day. Seventeen declared that the escort was worried, the usual concerns being driving in London and looking after a postoperative patient, and potential nausea and pain on the journey home. Travelling times were as follows: 1–2 h, 28; 2–3 h, 17; 3–4 h, 11; and over 4 h, 2.

The range of distance was 25–340 miles, apart from one patient who flew the 8000 miles to Hong Kong. Modes of transport included: car, 29; train, 27; coach, 1; and aeroplane, 2.

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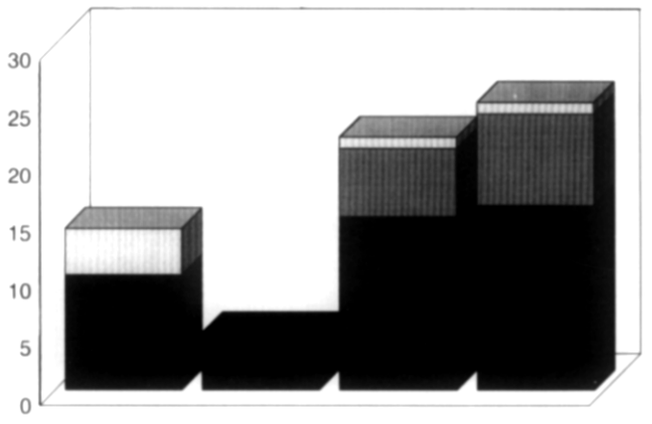

Figure 1 Incidence of nausea and pain in recovery area and on the journey home. □ severe; ▩ moderate; ■ mild.

We divided morbidity data into problems prior to discharge from the DSU and on the journey home. Fourteen patients (23%) experienced nausea prior to discharge; in 10 of them it was only mild, but in four it was quite severe, with two of these being delayed in recovery but subsequently being discharged with no nausea. Five patients who experienced nausea in the recovery phase (two severe and three mild) went on to experience nausea on the way home, and three of them felt that their journey contributed to this.

Postoperative pain was more common, with 22 patients (37%) complaining of pain in the DSU; 15 mild; six moderate and one severe. Thirty-seven patients had no pain while still in hospital; 25 patients (42%) had some pain on the way home; 15 mild discomfort, eight moderate and the same one patient who described severe pain (Figure 1). Eleven of these patients felt that their journey contributed to their pain and seven of these were patients with a journey time >2 h; 34 patients had no pain on the way home. Despite the apparently high incidence of some pain, all patients expressed satisfaction with their treatment on the day of surgery, and all felt that they had been discharged with sufficient painkillers.

Only two patients felt their general practitioner was uninformed of their operation, and did not know who to contact if they had any problems postoperatively at home. Eight patients visited their general practitioner in the first week postoperatively.

Discussion

Our study raises a few questions with respect to day case surgery, especially if long distances are involved. First, it would seem apparent that patients are willing to travel longer distances for their surgery and have little difficulty recruiting an escort to look after them. Patients can arrange complex travel arrangements, e.g. car–train–taxi to travel home. We concentrated on the time taken to get home as this would seem to be most important; a relatively short distance in slow-moving traffic may take the same time as a longer train journey and potentially in less comfortable surroundings. It must be remembered though that our group of patients are highly motivated as they have been referred, often after procedures at their local hospital, for further surgical intervention for infertility.

In our group of patients nausea was not a significant problem, but it could be quite a barrier to long distance travel. The group of patients who experience nausea in the primary and secondary phases of recovery may represent a group that should be given prophylactic ondansetron prior to discharge from hospital.

Analgesia in our group correlated with the figures found in our general day surgery audit, and it seems apparent that patients will declare that they had some pain, but for a variety of reasons did not request or self-administer analgesia. This does not mean that we should be complacent about the level of analgesia achieved. We should continue to endeavour to ensure that all patients are pain free where possible before leaving the DSU.

However, all the patients expressed satisfaction with their treatment (perhaps biased by their motivation to have surgery). Therefore, with sufficient community support, i.e. good communication with the patient's general practitioner, and adequate information and education given to the patient and their escort with regards to their surgery, limitations on activity, potential complications and methods of analgesia, then the distance travelled by the patient should not be a barrier to receiving their treatment as a day stay patient.

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Value-based anesthesia care for the adult outpatient — discussed at 1995 American Society of Anesthesiologists Annual Meeting

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On Tuesday, October 24, 1995, a well-attended panel on 'Value-based anesthesia care for the adult outpatient' was convened at the Annual Meeting of the American Society of Anesthesiologists, held at the Georgia World Congress Center in Atlanta, Georgia.

Moderator Jeffrey Apfelbaum, Associate Professor and Vice Chair, Clinical Affairs, and Director, Outpatient Surgery for the Department of Anesthesia and Critical Care of the University of Chicago, began the session with a brief introduction of the concept behind the panel, entitled 'Value-based care – definitions/considerations'. Dr Apfelbaum detailed the background for the concept that value-based anesthesia care can be interpreted as quality anesthesia care at a reasonable cost. Such costs include not only drug acquisition costs *per se*, but also include pre-, intra- and postoperative factors. Dr Apfelbaum stated that, at the University of Chicago, anesthetic drug costs were approximately 7% of the operating room budget vs. approximately 38% for recovery room costs. He also referred to an abstract presented at the 1995 ASA Annual Meeting by David Lubarsky and colleagues from Duke University, Durham, NC, which showed that operating room and postanesthesia care unit (PACU) costs were two orders of magnitude greater than drug costs for the outpatient procedures studied by the Duke group. These examples illustrated the point that cost containment efforts, in so far as they affect the delivery of value-based anesthesia care, need to be focussed on all aspects of perioperative care.

After Dr Apfelbaum's introductory summary of the panel's focus, Patricia A. Kapur, Director, UCLA Surgery Center and Associate Professor of Anesthesiology at the University of California School of Medicine, Los Angeles, spoke on 'The anesthesiologist as a facility manager'. The continuous quality improvement approach used as a management tool to seek out systems improvement opportunities to provide quality perioperative care in ambulatory surgery facilities at an acceptable cost was described. Some of the needs of a facility's 'customers' were identified, including those of patients, surgeons, anesthesiologists and third-party payors, as a framework to selected administrative action priorities. Management strategies to optimize staff, equipment, instruments and supply utilization were discussed. The ability to alter staff deployment between the preoperative preparation area, the PACU and the phase II recovery areas are essential in order to optimize staff utilization and to match staff availability to whichever area has the most patient need as the day progresses. Cross-training between operating room tasks and recovery tasks is also a helpful strategy in order to minimize under-utilization of staff. The use of sufficient ancillary staff to carry out support duties, that do not require professional licensure, contributes to cost-effective staffing. Examples include licensed vocational nurses and clinical assistants in preoperative and recovery areas, scrub technicians in the operating rooms and anesthesia technicians to make rooms ready so that the anesthesiologist can go directly from recovery to see the next patient.

Fine-tuning the operating room schedule throughout the day was noted to be a powerful management tool to ensure the best utilization of perioperative resources. Staff flexibility to adapt at short notice to changing work assignments can help the ambulatory facility to cope with changes in the daily schedule, as cases change rooms and surgeons or patients arrive early or late. Combined limited block scheduling (for surgeons who will actually fill the blocks) plus open booking for the remaining time is frequently used in the ambulatory surgery setting. The anesthesiologist facility manager is in a good position to make decisions that contribute to cost-effective operating room scheduling. Another function of an anesthesiologist, serving as the facility administrator, is the development of product lines and package pricing to attract and maintain future patient flow to the center. Marketing, involving outreach to patients, surgeons and to payor groups, is commonplace for ambulatory surgical facilities in competitive markets.

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Professor of Medicine at the University of Chicago, followed with a discussion of 'Value-based considerations in the choice of anesthetic technique, general anesthesia, monitored anesthesia care, regional anesthesia'. Dr Roizen reviewed some of the available data on this subject in the ambulatory setting, as well as the areas where little data is available. Some of these studies are limited in interpretation by the constraints of the clinical protocols in place at the institutions where they were performed. Because old-style system adaptations in a particular facility can make cost savings impossible for the anesthesiologist, it is not clear that the overall costs can be solely determined by the choice of anesthetic techniques. Examples of this could include the lack of a suitable area in which to place an arm block prior to surgery, resulting in the utilization of expensive operating room time to place the block, despite potentially lower drug costs and less expensive recovery time with regional techniques for arm surgery. Outdated recovery paradigms, such as a minimum PACU time required for all patients, regardless of how soon they meet phase II recovery criteria, can defeat cost-saving benefits from quick recoveries after short-acting drugs. Similarly, outdated requirements for every patient to have oral intake before discharge may exacerbate nausea and vomiting and further prolong costly recovery stay. Requiring every patient to wait until they can void, as compared to using this criterion only for those patients with specific indications, can also negate cost-savings by increasing staff requirements and slowing the throughput in the phase II area. Dr Roizen emphasized that each anesthesiologist, as the perioperative physician, can make a difference by introducing changes in the environment of their institution and applying a multidisciplinary approach among physicians, nurses, ancillary staff and administrators to analyse systems, processes, policies and patient flow patterns so that the overall resource consumption pattern can be optimized for each patient.

The next speaker was Charles H. McLeskey, Professor and Chair of the Department of Anesthesiology at the Scott and White Hospital and Clinic, Texas A & M University Health Science Center, Temple, Texas, whose assigned topic was 'Perioperative nausea/vomiting (PONV): prophylaxis and/or treatment'. Dr McLeskey began by explaining the unique arrangement at Scott and White, where three inter-related, physician-owned entities exist: a tertiary care hospital which serves as the teaching facility for the medical school at Texas A & M University; an outpatient clinic complex; and a health maintenance organization (HMO). The costs incurred providing patient care at the hospital and clinics determine the prices the HMO has to charge to contract for patients, and therefore if the HMO is forced to lower prices in order to win contracts for patients, there will be fewer funds available per patient for the clinics and hospital to provide the care. Because all three entities are owned by the same physicians, there is a unity of objective to optimize service per cost incurred. Furthermore, at Scott and White the operating and recovery employees and facilities have been merged with the Department of Anesthesiology to create one unit dedicated to value-based perioperative care.

With regard to perioperative nausea and emesis, Dr McLeskey chose ondansetron as an example to demonstrate that the prevention and/or effective treatment of nausea and emesis with minimal or no side effects has the potential to obviate delays in postoperative recovery that can otherwise be costly to the institution. Furthermore, patient satisfaction is improved by minimizing PONV. Dr McLeskey discussed the effects of various antiemetics in suppressing activation of the chemoreceptor trigger zone in the central nervous system. The role of anesthetics and adjuvants in aggravating or reducing emesis in the ambulatory setting was also discussed. In deciding whether or not to administer an antiemetic and the choice of such a drug, Dr McLeskey cautioned the audience to strike a balance between: (a) the likelihood of a particular patient experiencing PONV; (b) drug effectiveness; (c) side effects; (d) acquisition costs and (e) savings from the decreased utilization of overall recovery resources.

The final presentation was also delivered by Dr Apfelbaum. It was entitled 'Rethinking the PACU: can we bypass phase I recovery using a short-acting, fast exit (SAFE) technique?'. Dr Apfelbaum posed the question as to whether an intensive care environment (i.e. PACU) is really warranted for healthy ambulatory surgery patients who are awake and alert and even able to sit or stand at the end of their surgery, as a result of the use of newer, short-acting pharmaceutical agents. Because, as detailed in his earlier introductory remarks, the major factor for recovery resource utilizaton is labor costs, the elimination of unnecessarily complex care could lead to cost savings, assuming staff deployment patterns can be altered. Dr Apfelbaum described the procedure at the University of Chicago ambulatory facility, where 10–15% of patients who received general anesthesia and who met the PACU discharge criteria in the operating room were transferred to the phase II chair in the operating room and allowed to bypass the PACU.

Dr Apfelbaum then went on to discuss the Aldrete discharge criteria and to distinguish PACU discharge criteria from 'home-readiness' criteria that permit discharge from the phase II unit. He also clarified for the audience the recovery requirements of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), i.e. that appropriate recovery care be available, and those of the American Society of Anesthesiologists (ASA), that a "PACU or an area which provides equivalent postanesthesia care shall be available to receive patients after anesthesia care", and that "all patients who receive anesthesia care shall be admitted to the PACU or its equivalent except by specific order of the anesthesiologist responsible for the patient's care". Dr Apfelbaum then concluded that certain patients may be permitted to bypass the expensive intensive care setting provided by a PACU and go directly to the phase II recovery unit if they were judged to meet the institution's PACU discharge criteria in the operating room.

Dr Apfelbaum concluded by informing the audience of a multicenter study which was about to commence, the goal of which will be to determine if the use of short-acting anesthetics and adjuvants, by allowing patients to bypass the PACU, can result in cost savings

compared to the traditional two-phase recovery patterns for all patients. Dr Apfelbaum emphasized that close cooperation between the ambulatory facility's anesthesiologists and administrators would be required, because savings will only be achieved by alterations in processes and systems as well as by staff redeployment.

A brief but lively question and answer period ensued. A topic of particular interest was how to carry out regional anesthesia in the ambulatory setting cost effectively. The consensus of opinion was to place blocks before entering the operating room. Placing the block in an area where the nurse who subsequently watches the patient until the operating room is ready can also be assigned other patients is more cost effective than one-to-one observation after the block is placed. Use of shorter-acting local anesthetic agents was discussed in order to reduce the recovery time to void and ambulate after spinal and epidural anesthesia. The audience was cautioned not to administer intrathecal lidocaine through needles smaller than 25 gauge for safety reasons. It was suggested that arm and ankle blocks can usually go directly to the phase II area if the patients are awake and alert. Some panelists and audience members stated that they do not keep patients in the PACU until complete recovery from epidural or spinal blockade. At such facilities, the timing of transfer of post-spinal or post-epidural patients to phase II areas varied. Some transferred post-spinal or post-epidural patients to phase II directly from the operating room if awake and alert, whereas others transferred such patients to phase II after some evidence of return of motor function in the PACU.

Staffing in phase II areas was discussed, including the supplementary use of ancillary personnel to allow a registered nurse to oversee a number of patients in phase II concomitantly. Dr Apfelbaum stated that in his unit, family members help to provide phase II care, including duties such as helping the patients to the rest room and to get dressed. The optimal design of new facilities was discussed with the recommendation to provide more flexible recovery space and possibly more phase II than PACU spaces, because the new anesthetic agents and new recovery management approaches could be anticipated to result in a greater flow of patients to phase II than to the PACU.

At this point, the audience and panelists reluctantly dispersed after concluding a very stimulating session.