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Editoral
James H. Nicoll (1864–1921)

It is a 100 years, this year, since James H. Nicoll initiated modern day surgery. In 1899 he started to follow up the results of the outpatient surgical treatment he undertook on children at the Sick Children's Hospital and Dispensary in West Graham Street, Glasgow. The Dispensary, itself, had been officially opened in October 1888 as the outpatient department for the Glasgow Hospital for Sick Children which had opened in December 1882 and was a 5 min walk away. James Finlayson, MD, visiting Physician to the Glasgow Hospital for Sick Children, wrote in 1888 that "A very large proportion of the ailments of children, especially at the earlier years, can be better and more economically dealt with in the outpatient department, and a selection of suitable cases, only possible from the large field of outpatients, would make the treatment of cases in the wards more profitable in every sense. In the first years of this Hospital (The Glasgow Hospital for Sick Children) not a few of the children admitted to the medical wards were scarcely suitable for treatment there. With the advance of time more suitable cases have of late been admitted, but with an efficient outpatient department a better selection of cases, i.e. of cases pre-eminently adapted for in-door treatment, could be made, and so the expenditure of the Hospital applied to greater advantage".

The Dispensary was "readily reached by tramway from any part of the city" and would act as a feeder to the main hospital inpatient medical wards. But more importantly the hospital itself could only treat about 500 cases a year by the mid 1880s and there were "always cases waiting admission and at times as many as 50 patients' names appear in the book as anxious for treatment, but not able to obtain admission for want of greater accommodation". But with a Dispensary thousands of children each year could be treated, inappropriate cases not admitted and waiting lists for inpatient or as it was then termed 'in-door' treatment reduced. The number of cases treated at the Dispensary rose from 4000 in 1889 to 7000 in 1890 and to over 10 000 in 1904. Most of these cases were medical with bronchitis, pneumonia, diarrhoea, atrophy, debility, dyspepsia, and gastric and intestinal catarrh the commonest ailments.

In the 1880s in Glasgow poverty was widespread and child mortality high. On average 6735 children under 10 years of age died each year in Glasgow amounting to almost 50% of the total mortality of the city. With this in mind, the services provided by the Dispensary were free of charge with no necessity for subscribers' lines. A statement at the opening of the Dispensary said for treatment "It will be enough that the child is sick and poor".

Initially there were two full-time trained nurses. These two sisters worked independently from the inpatient hospital. They spent their mornings in the Dispensary and their afternoons visiting patients in their homes. One looked after the medical cases and the other the surgical. Three honorary surgeons and three honorary physicians were appointed at the outset. These were all highly qualified and gave their services gratuitously. Nicoll was not amongst these original appointees but took up his post with the second wave of appointments in May 1894 at the age of 30 years.

The son of a Free Church minister, Nicoll was educated at Glasgow University and travelled widely during his career to foreign medical schools even as far away as Moscow. He operated on large numbers of cases at the Dispensary proving that, given perfect technique, hernias, spina bifida, mastoid disease, talipes equinus and cleft palates in suckling infants could successfully be treated on an outpatient basis. Between 1899 and 1901 he undertook for hare lip and cleft palate no less than 406 operations. Chloroform was almost certainly the anaesthetic used for the majority of cases. In 1909 he reported in the British Medical Journal a series of 8988 paediatric surgical procedures (7392 performed by himself) performed at the Dispensary between 1899 and 1908. Nearly half these patients were under 3 years of age and many under 1 year. He stated that "in children under 2 years of age there are few operations indeed which cannot be as advantageously carried out in the outpatient department as in the wards, and, while the number increases with each year, the increase is not great until the age of 5 is reached". Much inpatient treatment Nicoll believed was a waste of hospital resources since "the results obtained in the outpatient department at a tithe (tenth) of the cost are

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equally good''. He also felt that the concept of a child resting peacefully in their cot in hospital following surgery was a ''pretty idea, rarely obtainable''. Consequently ''young children, with their wounds closed by collodion or rubber plastic, are easily carried home in their mothers' arms, and rest there more quietly, on the whole, than anywhere else''.

Much of Nicoll's early work at the Dispensary was done in less than ideal conditions. Although the Dispensary was purpose designed, initially hot water was not available on tap and electric light was not installed in the surgical room until the beginning of the 20th century. The Dispensary, due to its success, soon became inadequate in size and work began on an extension in 1896. This allowed the introduction of aural, dental and ophthalmic services. It also gave the directors of the Dispensary the opportunity to build a first floor lecture theatre. Professor Leishman, (Regius Professor of Midwifery, Glasgow—not his son the pathologist) had stressed at the opening ceremony of the Dispensary the enormous opportunities the facility offered for the education of medical students in common conditions. At last teaching facilities were available. Nicoll, when Professor of Surgery at Anderson College, was a popular teacher with the students who contested for the front seats at his lectures. At the Dispensary he not only taught medical students but also nurses. In 1897, distraught by the lack of teaching aids, he personally donated a ''student's set of bones'' and ''a manakin'' to the Dispensary. Later, in 1903, he paid £10 to enable electric light to be installed in the lecture room.

Nicoll strongly believed that mothers and children should not be separated. Thus in 1904 he rented a house, paid for out of his own pocket, near the Dispensary where mother and child could be accommodated together after surgery and visited by the Dispensary staff.

Although he did not undertake adult day surgery, in his work at the Western Infirmary he sought to reduce the post-operative period in bed to under a week.

Nicoll was a bachelor who devoted himself to his work. He was popular amongst his colleagues, nurses, patients and the public of Glasgow, exhibiting great charm and grace. As Assessor to the Rector of Glasgow University he worked with President Poincaré of France when he took up this post. When Poincaré returned to France he awarded Nicoll the cross of the Legion of Honour.

Nicoll died on 16th August 1921 following a period of ill health consequent upon dysentery acquired during his war service in France in 1918. He was 56-years-old.

The concepts he espoused were radical in their day yet accord well with the principles of day surgery 100 years later. He believed that children, where possible and after careful selection, were best nursed at home by their own mothers. Prolonged post-operative bed rest was not only not feasible with children but also harmful. By removing cases from the inpatient wards to the outpatient Dispensary, treatment would not only be of higher quality but also more cost effective. Equally the reduction of pressure on inpatient beds would reduce waiting lists for admission. He believed that the nurses undertaking outpatient treatment should be separate from those dealing with inpatients and that there was benefit in outreach nurses visiting certain children post-operatively in their homes. Like the directors of the Dispensary, he believed that the outpatient surgery unit was a valuable teaching resource. He developed teaching facilities in the Dispensary both for medical students and nurses. His house providing accommodation for mothers and children is surely the forerunner of modern hospital hotels and the concept of the free-standing Dispensary being a 'feeder' for the inpatient hospital is one that is at present being replicated around the world.

James Nicoll, great technical surgeon, radical thinker, popular teacher and charming gentleman was truly the founder of modern day surgery.

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Patients' perceptions of day surgery: A literature review

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Abstract

Medical and pharmacological advances in surgery have contributed to the current and continued growth of day surgery. As the majority of adult UK elective surgery now takes place within day surgery facilities, these changes will inevitably have an impact upon nursing intervention. Past nursing practices may have to undergo a period of redevelopment in order to meet these changes and the logical first step towards any innovative change must involve acquiring the views of patients. The main themes to emerge related to nursing practice, information provision, experiences within day surgery and recovery at home. The overwhelming principle challenge was that of information provision followed closely by postoperative pain management.

Keywords: Day surgery; Satisfaction; Ambulatory surgery; Anxiety

1. Day surgery growth

The amount of day surgery has increased over the last 10 years (Table 1) and will continue to do so both in absolute terms and as a proportion of the total surgical workload [1–5]. Day case surgery has been defined as 'a patient who is admitted for investigation or operation on a planned non-resident basis and who nonetheless requires facilities for recovery' [6].

Table 1
Day case surgery as a percentage of all elective surgical admissions in the UK

Date	Day cases (%)
1989/90	34
1990/91	37
1991/92	41
1992/93	45.5
1983/94	48
1994/95	52

Reference: [5].

The Department of Health Performance Guide [7] in which the average national performance figures for three common day surgery procedures are highlighted, clearly demonstrates the impact day surgery is having upon elective UK surgery (Table 2). Its growth has occurred mainly as a result of medical advances and central Government initiatives [8]. The NHS study [9] 'Day Surgery: Report by the Day Surgery Task Force' states that 50% of all elective surgery should be undertaken on a day surgery basis by 1997/98 with some surgical specialities being able to achieve 80% by the millennium. The future growth of day surgery will depend in part, however, on public acceptance [10] and in order to gauge the publics view of day surgery their opinion must be sought. Medical changes in the way patients are treated surgically is inevitably having a considerable impact upon surgical nursing practice, i.e. involving the development of pre-assessment clinics, information provision, same-day discharge and recovery at home. The differences between ambulatory surgical nursing and in-patient surgical nursing may be growing [11,12]. As a result, the data provided from in-patient studies concerning the nursing management

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Table 2
Department of health performance guide (league tables)

	Inguinal hernia repair	Cataract extraction	Laparoscopic sterilisation
% Of total numbers of UK operations undertaken as day surgery	37	56	80

Reference: [7].

of patients may no longer be applicable to the majority of elective, adult, general surgery patients. Studies which focus specifically upon patients experience of limited hospital stay and comparatively less contact with hospital staff as the norm may increasingly yield information more pertinent to today's surgical healthcare system [13,14,10].

2. The patients' perspective

A review of the literature on patients views of day surgery was undertaken utilising a database search which employed Medline, CINAHL, (cumulative index to nursing and allied health literature) and a cross-reference search. Key word combinations were day surgery and satisfaction, ambulatory surgery and satisfaction, anxiety and day surgery and anxiety and ambulatory surgery. The earliest study was from 1978, 12 were from the 1980s and 54 (81% of the total) from the 1990s. The majority were undertaken in America, England, Europe and Australia. A total of 67 studies were identified, both large and small, all of which were utilised as the number of full research studies within day surgery is limited. Furthermore, a systematic review of the literature concerning patients' experiences of day surgery has not been previously undertaken. Studies which merely asked 'were you satisfied with day surgery' or 'what level of pain did you experience' were obviously far too brief and omitted. The only criterion for inclusion was that the data collected was specifically from elective, adult day surgery patients undergoing general, local or regional anaesthesia and was concerned with the patients' self-reported experiences. From the review, four main themes emerged and these relate to: (i) nursing practice; (ii) information provision; (iii) patients' experience within day surgery; and (iv) recovery at home.

2.1. Nursing practice

The need for pre-assessment clinics to help adequately assess patients' fitness for surgery, provide instructions regarding their care and recovery at home and increase the nurses patient contact time to help allay fears, was a strong theme. Implicit within this theme was the provision of information which will be considered separately as the nursing practice aspect also concerned wider issues, i.e. preoperative instructions, pre-operative anxiety management, patients expectations and discharge.

An audit by Bottrill [15] revealed that pre-assessment clinics were beneficial as nurses had more time to explain treatment to patients which in turn led to a reduction in the junior doctors workload, although the audit only gained a 37% response rate and only included gynaecological patients. In a large study by Guilbert and Roter [16] concerning coping at home after surgery, the most important determinant of satisfaction was patient preparation, i.e. effective communication and instruction. In a study specifically concerned with teaching in day surgery, Brumfield et al. [17] interviewed both patients and nurses about information provision. Patients preferred teaching to take place prior to admission which currently does not occur in all day surgery facilities. The study focused upon patients undergoing laparoscopic surgery, some of which were undertaken for diagnostic purposes, i.e. investigating fertility problems, and this may have influenced the patients informational requirements. In a survey by Harju [18], data was collected using a small questionnaire 3 months after surgery. It revealed that 74% of patients were satisfied with day surgery which was attributed, in part, to good patient selection and adequate pre-operative teaching as part of the pre-assessment visit. Kleinbeck and Hoffart [19] revealed that patients felt quite vulnerable when going home and were unsure about what activities they could perform around the house as clear instructions pre-operatively had not been provided. This led to the trial and error learning of every day activities around the home. Within this American study the literal meaning of day surgery may have been utilised as it states that 'we selected adult patients who were scheduled for elective laparoscopic cholecystectomy procedures and were to be discharged within 23 h after surgery' (pp. 394–395). This leads one to assume that the patients may have spent up to 20 h in the day surgery facility which would not be currently appropriate in most UK facilities. The effects of day surgery facilities without preassessment clinics were highlighted by Rudkin et al. [20] who examined the differences between dedicated day surgery facilities, i.e. own ward and theatre, and mixed facilities, i.e. no separate ward or theatre facilities in eight

Australasian day surgery centres. They concluded that information provision, waiting time and general satisfaction within dedicated units all evaluated better than the mixed in-patient facilities which has obvious implications for future building and resource planning programmes.

Contact prior to the day of surgery has also been seen to help reduce anxiety. In a survey which examined satisfaction with anaesthesia Gupta et al. [21] discovered that 50% of patients would have preferred pre-medication to help allay their fears. It recommended that greater emphasis be placed upon interventions designed to help reduce anxiety in the pre-operative stages. This may be necessary irrespective of the type of anaesthetic used, i.e. local, general or regional. Mealy et al. [22] recommended that a β-blocker (propranolol 10 mg) be routinely given to all patients to help reduce anxiety. A further three studies also suggested premedication to help allay fears and relieve anxiety [21,23,24]. Novice patients, patients with previous unpleasant experiences, female patients and patients undergoing oral surgery all had increased anxiety scores in a study by Mackenzie [24]. It was recommended that, once identified, anxious patients could be given reassurance and anxiolytic medication. Male [23] and Wicklin and Forster [25] also concluded that female patients and patients undergoing local anaesthesia were more anxious, although this data was gained immediately prior to anaesthesia. Nkyekyer [26] revealed that 60% of patients witnessed the care of an unconscious patient while in the day surgery facility and of these, 46% were made more anxious.

Four studies have suggested that general anaesthesia causes much anxiety for patients [23,27–29], whereas others have suggested that patients undergoing local anaesthesia are even more anxious [30] and some more dissatisfied [31]. Furthermore, it was established by Nyamathi and Kashiwabara [32] that the pre-operative cognitive ability of all patients on the day of surgery was reduced. To establish this, the subjects were asked to complete a self-rating of their anxiety and a 100-item critical thinking test immediately prior to a general anaesthetic. A study by Domar et al. [33] examining methods of anxiety reduction highlighted the benefits of contact before surgery for instruction purposes as patients on a programme of relaxation reported being less anxious in the days prior to surgery. The experimental group, however, received more attention than the control group which could therefore have influenced the data. Moreover, the operations were not simple as all the patients involved were undergoing surgery for skin cancer although it does demonstrate that contact on a number of occasions in the pre-operative stages can have a positive effect upon anxiety levels. Markland and Hardy [34] also had positive results when investigating relaxation prior to surgery. In this study the control group received 'routine' ward care which is not necessarily a reliable or measurable comparison [35].

Gaberson [36] examined the possible benefits of distraction in an effort to reduce anxiety as part of the pre-operative preparation process. Distraction via audio-tape was carried out following admission and lasted for 20 min. No significant reduction in anxiety was established although a longer programme of distraction commencing a number of weeks prior to surgery may have had a greater impact. Augustin and Hains [37] achieved significant results using a choice of audio-taped music albeit on one physiological measure. In a study by Gamotis et al. [11] in which in-patient and day-patient satisfaction were compared, it was revealed that day-patients were more satisfied, in part, because their interaction with staff was more structured and organised, i.e. in pre-assessment clinic and on the day of surgery. However, the female in-patients were more satisfied with the relationship established with the nurses indicating that the comparatively shorter time spent in day surgery did not allow time for this type of bond to be established. Jamison et al. [38] specifically examined the psychological factors believed to influence recovery and concluded that patients who were more anxious pre-operatively were prone to a greater number of complications following surgery. Patients who had a greater number of negative feelings about their recovery also experienced a slower recovery.

The mere physical presence of the nurse was seen to have a positive effect upon anxiety management. Parsons et al. [39] conducted a study to ascertain which behaviours were deemed as caring by patients. Various categories emerged but the top three caring behaviours were reassuring presence of the nurse, verbal reassurance and attention to physical comfort. Therefore, the nurse just being in close proximity to the patient while he/she was in the day surgery facility and expressing concern was viewed as very helpful during periods of increased anxiety. Cozzarelli [40] concluded that helping a patient to increase their feelings of self-efficacy (perceived ability to perform a task well or cope well with a procedure) by providing positive feedback was also an aspect of the nurses therapeutic role. The patients in this study were undergoing day surgery for the termination of pregnancy which may carry a high emotive value and may have accounted, in part, for the reduced number of subjects (38%) who completed all three stages of the study. Vogelsang [41] further highlighted the importance of the therapeutic role of the nurse as it was established that continued contact with one nurse, i.e. from the preassessment clinic through to discharge on the day of surgery, improved satisfaction with care and led to an earlier discharge. Icenhour [42] established that some patients felt rushed and unable to gather all relevant instructions during their admission. Having relatives present on the day of surgery to assist

with information gathering also highlighted their therapeutic role.

Pre-assessment was also viewed as an essential period in which recovery from surgery at home can be discussed (Section 2.4). Pain was identified as a considerable problem following day surgery in a study by Firth [43] where patients had expected to have some pain but had not purchased any analgesia prior to admission. This was either because they had expected the hospital to provide analgesia or they had not been adequately instructed prior to admission. To improve the problem of post-operative pain management it was suggested by Lewin and Razis [44] and Marquardt and Razis [45] that pre-packed analgesia packs with relevant, accompanying information be provided. These packs would vary according to the operation type and may help to establish a more effective programme of pain management. This may involve the nursing staff establishing which pack to administer, explaining to the patient the accompanying information and possibly, in some instances, securing payment. Thatcher [46] in a qualitative study established that pain on discharge was expected but when the recommended or prescribed analgesia did not bring relief, patients found it difficult to cope. One patient was required to pay for the analgesia prescribed and therefore refused the medication.

Discharge from a day surgery facility is largely based on medical criteria. Stephenson [47] in a small study, which is a little vague in parts, established a discharge guide. It was discovered that no patient was fully alert after 30 min and that 57% experienced drowsiness within the first 24 h. Eight studies (Section 2.4) also recommend a telephone helpline be established following discharge to routinely contact patients within the first few days at home. Furthermore, in a telephone follow-up survey conducted by Hawkshaw [48] to evaluate satisfaction with care, one of the unforeseen benefits resulting from this method of data collection was that the patients viewed the telephone interview as a valuable part of their care and a chance to ask questions.

2.2. Information provision

The largest theme highlighted in 30 studies (45% of total) relates to information difficulties. More specifically, the lack of information provision, the differing levels of information possibly required, the mode of provision and its timing. Firstly, a comprehensive study by Pollock and Trendholm [49], for 'which'—the independent consumer guide magazine revealed that information provision was a major issue as 'it was clear from our survey that people who were given the least information were the most dissatisfied with day surgery' (p. 16). The Royal College of Surgeons and East Anglian Regional Health Authority [10] also conducted a comprehensive and highly informative study in which data was collected both on a regional and district basis, incorporated 10 day surgery units, 30 consultant surgeons and 1434 patients. Patients expressed many concerns regarding their forthcoming surgery, the main one being information provision. The study went on to say that although 75% of the patients were satisfied with the care and information they received 'this overall appraisal conceals significant levels of dissatisfaction in certain areas....' (p. 2).

In a qualitative study by Otte [14] subjects preferred the convenience of day surgery as it was less disruptive to their lifestyle although they experienced major problems of communication. All the patients stated that they were unprepared in terms of informational and educational support for their surgery. However, the patients in this study all underwent surgery on a mixed ward facility which has been demonstrated to be less efficient than dedicated facilities [20]. Kempe and Gelazis [50] studied the effects of pre-operative verbal and written information on anxiety and concluded that greater psychological preparation, i.e. an increased amount of information, resulted in a less anxious patient. No account was given to the effect of increased attention provided for the subjects in the experimental group or that they were given a systematic programme of information. A study which explored patients experience of laparoscopic surgery was undertaken by Nykekyer [26] and 29% of the patients were unhappy with the level of information they received. Furthermore, this figure could be higher as this data was collected 2 weeks after surgery in the hospital out-patient department. Asking patients to comment about their care whilst still undergoing medical treatment has been seen to give rise to inaccurate responses [51] and in an attempt to circumvent this problem, some studies have utilised postal questionnaires following discharge.

Sigurdardottir [52] in a postal survey, compared satisfaction with care between 2 day surgery facilities and the main areas of concern stemmed from the lack of adequate information as 'the patients were least satisfied with items related to the educational sub-scale as they seldom received any booklets or pamphlets relating to the surgery' (p. 73). Again, however, one of the facilities within this study was a mixed facility. Buttery et al. [53], although only using a short questionnaire, established that most patients were satisfied with day surgery. The main criticisms centred around the long pre-operative waiting period, the lack of post-operative privacy and the provision of insufficient information. Willis et al. [54] conducted a postal questionnaire and discovered that there were significant correlations between receiving written information and the level of satisfaction, and receiving an explanation and recommending day surgery to a friend. MacAndie and Bing-

ham [55] examined patient satisfaction and general practitioner involvement in care. A total of 20% stated that their discharge information was excellent and 50% good, while the remainder were dissatisfied. King [56] revealed from the subjects who replied (44% response rate) that 30% received no written information concerning their care although 97% were happy with their discharge information. A 44% response rate, although good for a postal questionnaire, may also hide the true level of satisfaction, i.e. are those who did not reply too dissatisfied/satisfied to do so?

Five studies have highlighted an inherent dilemma with information provision in that too much and also too little can cause an increase in anxiety. Oberle et al. [57] stated that 'although 25% of patients indicated that they had received little or no information about their surgery and post-operative course, some of them were satisfied with that; they indicated that they simply preferred not to have any details about their upcoming surgery, because the more they knew, the more frightened they would become' (p. 1024). In a study of patients undergoing surgery and general anaesthesia by Goldmann et al. [58] the effects of hypnosis and information provision on anxiety were examined. The question most frequently asked of the anaesthetist was whether induction of anaesthesia would be by mask or needle and the most informative aspect for the majority of patients was to be told the length of anaesthesia. Only a mean, significant difference in anxiety scores was achieved for patients who had undergone 3 min of hypnosis although it was established that 'The provision of information does not have a uniformly positive effect. Patients may either wish to be informed about the details of their operation, remain uniformed, or a mixture of both' [58]. In a study by Mitchell [29] female patients scheduled for day surgery were interviewed 1–2 h prior to general anaesthesia. The aim of the study was to establish a possible link between individual information requirements and locus of control. No significant link was gained although again the need for differing levels of information was established as 41% would have preferred a detailed booklet and 53% a simple information booklet. However, the data was collected from gynaecological patients only and at a very anxious period. A patient satisfaction survey by De Jesus et al. [59] revealed dissatisfaction with the information provision because of its lack of adaptation to home recovery. '... the single most common suggestion from surveyed patients on how to improve same day surgery services is to cater for possible complications through provision of clear and specific information' (p. 171) and it was again established that not all patients required the same level of information. An extensive study by Caldwell [60] concluded that patients may have differing informational requirements as those who had a greater need for information also had lower levels of pre-operative anxiety. A total of 43% of the patients within this study were uncertain about a diagnosis of malignancy. It concludes that identifying the patients who require more information could be very difficult.

A further four studies have demonstrated the need for patients not only to receive verbal and written information but also the chance to view, or take home to view, a video-tape concerning their surgical procedure. Wicklin and Forster [25] conducted a study to establish whether modelling of behaviours from a video-tape presentation prior to surgery was of greater benefit to patients than just the provision of information. The only conclusion was that females reported a greater level of pre-operative anxiety than males. The number of viewings and the duration of the presentation were not given. Lisko [61] conducted a small pilot study where gynaecological patients viewed a short video-tape presentation. The purpose was to encourage greater autonomy although no significant results were established. Baskerville et al. [62] over a 9 month period, provided patients with an audio-tape concerning their operation. The information was well received and highlighted the need for information prior to the day of surgery. Three further studies have highlighted the problem of the timing of information provision. Brumfield et al. [17] established that patients preferred teaching to take place prior to admission. In a study by Oberle et al. [57] a number of patients were dissatisfied with the timing of information provision as it did not occur until the morning of surgery. Mitchell [29] further revealed that 48% of patients would have preferred to receive some written information at least a few days prior to their operation.

Early discharge is preferred by patients although only when provided with adequate information [14]. In a study by Kleinbeck and Hoffart [19], the patients were unsure about what activities they could perform around the house and would have preferred more information concerning recovery at home, i.e. what activities can be undertaken and when. Donoghue et al. [63] reported patient satisfaction with the information they received although it did not cover possible problems at home. Guilbert and Roter [16] and Hawkshaw [48] stated that patients coped well at home when discharge information provision was good.

2.3. Patients experiences within day surgery

A number of issues relate to patients experiences of day surgery. They mainly concern their expectations, waiting following admission, lack of privacy, preference for an overnight stay and anxiety. A large number of studies highlighted the publics general satisfaction with, and preference for day surgery [18,21,38,49,52,53,64–67]. However, some aspects within day surgery were not

always expected. In a survey by MacAndie and Bingham [55] it was revealed that a number of patients thought day surgery was minor surgery while others were surprised at having to walk to theatre. Birch et al. [68] surveyed patients attitudes towards walk-in surgery and found that 98% expressed satisfaction for this approach although they were all still attending the hospital out-patients department at the time of data collection. In a study examining participation in decision making Avis [69] revealed that patients preferred to allow the doctors and nurses to make their choices as they viewed them as the experts but they also realised that this limited their involvement in decision making.

Following admission, seven studies reported that waiting for the operation was a problem as it led to an increase in anxiety. Pollock and Trendholm [49] reported 20% had to wait >3 h for their operation and Read [70], Otte [14], Rudkin et al. [20], Buttery et al. [53] and Ghosh and Sallam [67], all reported that anxiety was increased by the period of waiting following admission. Nkyekyer [26] and O'Connor et al. [65] reported that 34 and 11% of patients, respectively, found the wait prior to surgery too long. As a consequence, both Ghosh and Sallam [67] and Otte [14] recommended staggered admission times. Privacy within the day surgery facility was also a recurrent problem reported by Buttery et al. [53], Ghosh and Sallam [67] and the Royal College of Surgeons and East Anglian Regional Health Authority [10] all recommended improvements in this area.

Four studies revealed that some patients were not happy to go home following their surgery and would have preferred an overnight stay. In a comparatively older study by [71] 54% thought their stay was too short as opposed to 21% of the in-patients. [72] revealed that 74% would have preferred an overnight stay although this data was collected 3–6 months after surgery. In a study by [73], 8% would have preferred an overnight stay and [65] concluded that male patients may prefer day surgery more than females as 16% of females preferred an overnight stay. This figure increased further in a study by [26] as 52% of female patients would have preferred an overnight stay although these patients had all undergone intravenous sedation with local anaesthesia.

2.4. Recovery at home

The final theme relates to the first few days and weeks at home and concerns pain management, recovery and help required, and community health involvement. Firstly, [67] reported that one of the main sources of dissatisfaction in the post-operative period was inadequate pain relief and in studies by Clyne and Jamieson [64] and Birch and Miller [68], 50% of patients experienced pain while at home. [43], utilising a short questionnaire, discovered that 25% of the subjects were awake on their first post-operative night with pain and 31% of all the subjects received only partial or no relief from their pain using the prescribed drugs. [46] also reported that the recommended or prescribed analgesia did not always bring relief. [13] reported that the severity and duration of pain was not expected by most female patients and [74] further reported that female patients undergoing gynaecological surgery experienced a great deal of pain. Both Lewin and Razis [44] and Marquardt and Razis [45] concluded that postoperative pain management was a problem and recommended pre-packed analgesia with relevant information. [66] established that 96% of patients were satisfied with their post-operative pain management although in this study a community liaison sister visited during the immediate post-operative period for wound management and to give advice.

Once discharged from the hospital [21] discovered that some patients drove home (4%), many went home unaccompanied by an adult, 25% were alone during the first 24 h and 8% alone during the first 24 h without an adult to look after the children. [68] also found that 13% of patients drove their car the same day and the majority returned home alone. [75] utilising a short questionnaire reported that on the first night of discharge, 7% drove their car, 42.7% reported feeling drowsy and 38.8% had a headache; 'there was a wide distribution in the time to recover to full normal daily activity, ranging from the day of operation in four patients, 1 to 2 days in 45 patients, 3–5 days in 33 patients and $\geq$6days in 21 patients' (p. 29). [76] revealed the main post-operative problems were muscle aches, sore throat and drowsiness and [64] reported that 52% of patients stayed off work for >1 week. Recovery times may differ widely as Ratcliffe et al. [73] and Wilkinson et al. [77] established that almost three-quarters and 84%, respectively, still had problems 3 days after their operation, whereas [47] reported almost half were active on the second day and [76] reported that 32% resumed normal activities the next day with a further 62% after 3 days.

[78] conducted one of the few studies which also asked the carers to complete a questionnaire concerning their experiences of caring for a relative following day surgery. More than 30% of the patients required help with the activities of daily living in the first 7 days although 'helpers tended to overestimate the patients need for assistance' (p. 1006). [65] reported that 62% of patients required a carer for ≤ 1 day and 20% for 1–2 days. Female patients required more assistance than males with 3% paying someone to help with childcare, housework, etc. [10] revealed that more than one third of patients required a great deal of support from helpers at home, 20% of whom had to take time off work. [54] established that 21% of patients required

help from carers, 10% of whom had to take an average of 3 days off work with 7% losing earnings. To enable both patients and their carers to gain much needed advice following discharge, seven studies recommended the use of a telephone helpline [19,44,50,54,55,59,79]. In a study by [13] which was, in part, conducted over the telephone ,it states that 'there seemed to be a therapeutic factor embedded within the interview process for some women' (p.176).

The level of community health involvement was reported in 11 studies and mainly concerned visits to the general practitioner or by the district nurse. In a survey utilising two simple questions by [80], 93% of the patients, although having undergone a moderate surgical procedure and general anaesthesia, did not seek any community-based help in the first three post-operative days. [68] found that 19% had to contact their general practitioner within the first 2 weeks and [56] revealed that only 5% of patients required help in the first 48 h. [79] established that 19% of patients had to visit their general practitioner at least once regarding pain management or wound problems. An Australian study by [81] revealed that district nurses were utilised within the post-operative period for $\approx 2-3$ days. A total of 21% of patients contacted their general practitioner within the first 2 weeks regarding pain management or wound care. [72] found that day surgery patients required significantly more medical attention following their discharge. Likewise, in studies by the Royal College of Surgeons and East Anglian Regional Health Authority [10] and Willis et al. [54] almost half of the patients required help from one community health service. As ever more complex surgical procedures are undertaken within day surgery and the amount of day surgery increases, the workload within the community may also increase although cost savings may still be achieved as less time is spent in hospital [81].

3. Conclusions

Although satisfaction within day surgery is high, four main themes emerge of which information provision and pain management at home present the greatest challenges. Within nursing practice there is a strong requirement for the establishment of pre-assessment clinics to increase contact time with the patients, improve communication and help allay fears. A number of measures attained moderate success in anxiety management, i.e. early contact, relaxation, distraction, therapeutic role of the nurse and positive, encouraging statements. Other practices requiring consideration relate to patient discharge criteria, analgesia dispensing and telephone follow-up calls.

Issues surrounding the provision of information by far present the greatest challenge (improvements recommended by 45% of total) and are implicit within the other themes. A general lack of information is a common element especially within mixed facilities. However, not all patients want the same level of information as some are made more anxious with too much information and vice versa. Information relevant to home recovery, i.e. management of the wound, daily activity level, what to do if, etc. were all frequently cited as being most useful. Video-tape presentations had some success and providing information prior to admission was widely viewed as a positive step.

Patients' experience within day surgery relates to realistic expectations of procedures on the day, level of pain and incapacity following surgery. Much anxiety is generated by the time spent waiting for surgery following admission, the Iack of privacy and the prospect of undergoing any type of anaesthesia.

Finally, pain management is a considerable problem during recovery at home, especially for some gynaecological patients. Although carers were happy with their role, more information is required as is time in which to make social arrangements to accommodate their temporary role. There was generally only a small increase in the workload for general practitioners and district nurses although if the number of day surgery patients and procedures is to increase, this may change.

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Summary of studies into adult patients' perceptions of day surgery

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Table 1

Source	Sample	Purpose	Type of preparation	Measures	Findings
Avis [1]	22 Patients undergoing GA/LA for hernia repair	To evaluate patients' perception of choice day surgery	Normal ward routine	Tape recording of formal nursing and medical interaction, non-participant observation, field notes in OPD, tape-recorded interview of patient in own home	All the patients allowed their choices to be decided for them by health professionals. Patients considered themselves as the professional's 'work object' which left little room for participation in the decision making process. Themes–'being told' and 'going in to get it fixed'
Augustin et al. [2]	41 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the effectiveness of music in reducing preoperative anxiety	Random allocation to one of two conditions—routine care for control group and routine care plus 15–20 min listening to a choice of audio-taped music	Self-rating of anxiety both before and after routine care and music; also physiological measures, i.e. systolic and diastolic blood pressure, heart rate and respirations	Patients who received music therapy had significantly lower heart rates immediately prior to surgery than the control group. The experimental group also had a significant decrease in all four physiological variables between the pre and post-test. Concludes that routine care plus a choice of audio-taped music can help to reduced pre-operative anxiety
Baskerville et al. [3]	119 Patients undergoing LA for hernia repair	To evaluate the effects of a pre-operative audio-cassette tape	Audio-cassette tape of treatment and recovery; duration 20 min	Questionnaire designed by author to evaluate audio-tape	56% Listened more than twice. 75% listened with spouse. 90% found information adequate. 5% wanted more information. 98% said they benefited from the audio-taped information.
Birch et al. [4]	124 Patients undergoing LA for GU and general surgery	To evaluate patient anxiety levels	Questionnaire on admission; 64 patients had cystoscopy and 60 patients (control group) had general surgery	Questionnaire self-rating scale of anxiety plus visual analogue scale for anxiety	Patients more anxious prior to cystoscopy under LA especially female patients (although no statistical significance), younger patients and those undergoing the procedure for the first time. Anxiety not as high in the week prior to surgery.
Brich et al. [5]	86 Patients undergoing IV sedation and LA for genitio-scrotal surgery	To assess patient attitudes and extent of morbidity in first 24 with use on anxiolytic	Given anxiolytic, walked to theatre and positioned self on operating table; questionnaire given on discharge	Questionnaire 33-item Yes/No responses concerning discomfort during the procedure, social arrangements and morbidity. 2 weeks later interview via telephone or face-to-face in OPD regarding wound problems and walk-in surgery	98% of patients did not mind walking to theatre. 50% complained of post-operative pain. 47% returned home alone. 13% drove a car the same day. 19% contacted their GP in the first 1–2 weeks

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Bottrill et al. [6]	114 Patients undergoing GA/LA for gynaecological surgery	To evaluate a one-stop-shop for suitability for surgery	Offered day surgery, assessed and given a date for surgery on the same day	Patients returned via post National Audit Office patient satisfaction questionnaire	92% Satisfied with the information, 3% less than wanted and 5% more than wanted. Nurses most helpful in explaining operation. Using nurses to assess patients reduced junior doctors workload
Bruinfield et al. [7]	30 Patients undergoing GA for laparoscopic surgery and 29 unit nurses	To identify teaching content important in day surgery	Satisfaction questionnaire given on discharge for return via post in 2 weeks; nurses also completed questionnaire within same period	Both sets of questionnaires asked for perceptions of pre-operative teaching	Patients ranked procedural information (explaining the order of events) top and nurses psychological support top (dealing with worries, concerns, etc.). Teaching priorities therefore conflicted. Patients preferred teaching to take place prior to admission although some nurses thought some should take place on the day. Addressing patients' concerns and teaching prior to the day of surgery crucial to day surgery patients
Buttery et al. [8]	100 Patients undergoing a GA for a variety of surgical procedures	To assess patient satisfaction and post-operative morbidity	Satisfaction questionnaire given on discharge for return via post	Questionnaire contained ten simple items concerning waiting time for appointment, level of pain, nausea and vomiting and recovery rate	95% Overall satisfaction. Main problems lack of information as to their likely post-operative state, lack of privacy, waiting time in the day surgery facility too long and post-operative morbidity. Only 3% required contact with their GP
Caldwell [9]	69 Patients undergoing a GA/LA for variety of surgical procedures	To assess if patients who have a high preference for information experience less anxiety than patients with a low preference information	Questionnaire given prior to operation on day of surgery; questionnaire 20/30 min to complete	Self ratings of anxiety, level of information required and ways of coping	Day surgery was seen to be very anxiety provoking for all patients. Patients with a high preference for information had lower levels of anxiety pre-operatively than low preference for information patients. Teaching only essential information to low preference patients may avoid increasing anxiety still further. Determining what level is required by whom is very difficult

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Chung et al. [10]	1027 Patients undergoing GA/LA for a variety of surgical procedures	To assess post-operative morbidity	Telephone interview by nurses 24 h following surgery	Interview to gauge pain, nausea/vomiting, drowsiness, headache, fever, bleeding and satisfaction with anaesthesia, i.e. excellent, good or poor	LA accounted for 63% of dissatisfied patients. Recommends further study for pain relief in surgery utilising LA
Clyne et al. [11]	130 Patients undergoing GA/LA for varicose vein surgery	To critical analyse day surgery outcomes	Satisfaction with treatment questionnaire sent immediately following surgery	Ten-item questionnaire requiring Yes/No answers concerning pain, nausea/vomiting, need of other health professionals and recovery time	75% Were satisfied with returning home the same day. 88% thought their veins had improved with Surgery. 52% stayed off work >1 week. 50% required pain relief and 22 % experienced nausea/vomiting the day after surgery
Cozarelli [12]	112 Patients undergoing GA for the termination of pregnancy	To explore the relationship between personality traits and psychological adjustment	Questionnaires completed 1 h prior to surgery, 30 min after surgery and 3 weeks later	Prior to surgery self ratings of self-esteem, optimism, locus of control, self-efficacy and depression; after the surgery self ratings of depression and mood. 3 weeks later self ratings of depression and mood	Self-efficacy was significantly related to high self-esteem. Correlation's among self-esteem, optimism, perceived control and initial depression were moderately high and were all related to better post-abortion adjustment. Increased feeling of self-esteem is one of the most important personality traits as this influenced self-efficacy which in turn permitted successful coping
De Jesus et al. [13]	148 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate clinical outcomes and satisfaction with care	Questionnaire on admission prior to surgery; questionnaire sent 4/7 day following operation for return via post	Pre-operative questionnaire concerning amount of verbal and written information received; second questionnaire concerning morbidity, recovery times and help required	An increase in information provision is required for some (not all) patients. Information seen as crucial to day surgery patients. Single most common suggestion was for clear, specific information on how to deal with possible complications. Telephone follow-up service required. Information provision main factor in influencing clinical outcome and satisfaction with care

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Donoghue et al. [14]	31 Patients undergoing GA for gynaecological laparoscopic surgery	To assess post-operative morbidity, novice versus experienced patients, quality of data from telephone versus personal interview and quality of data	Random allocation to one of three interview conditions: (i) 1 week by personal interview and again at 3 weeks by telephone; (ii) 3 weeks by personal interview; and (iii) 3 weeks by telephone	All home interviews 30–60 min utilising: (i) 12-item demographic questionnaire, recovery process and medication; and (ii) semi-structured interview to describe experience; follow-up telephone interview factual 5 min talk concerning recovery; telephone interview at 3 weeks semi-structured	70% Received help from 1 or more adults. 29% received help from 1 or more younger people. Many reported unanticipated experiences i.e. severity and duration of pain was not expected, extent of disability, disruption to their work and home lives and the need for physical/emotional support afterwards. Few contacted any community service. Little difference between information gained at 1 and 3 weeks. Personal interviews gave richer data. Therapeutic and post-operative information required
Donoghue et al.l [15]	21 Male patients undergoing LA for cystoscopy	To assess morbidity, novice versus experienced patients, patients' perceptions and satisfaction	Random allocation to one of two interview conditions—3/6 days and 21/24 days post-operatively	Semi-structured tape recorded interviews; 20–50 min duration	Majority were satisfied with the information received. However, there was a lack of information when unexpected situation arose. Opportunity to discuss recovery should be available. Ways to ensure consistency of information should be explored
Domar et al. [16]	42 Patients undergoing LA for the removal of skin cancers	To identify if less pain and anxiety is experienced in patients who have undergone a preoperative programme of relaxation	Random allocation to one of two conditions—control group (20 min per day quiet reading), experimental group relaxation tape and relaxation instructions; 26 days prior to surgery mean experimental time	Ratings $\approx$26 days prior to operation—demographic details, blood pressure, pulse , self-rating of anxiety and symptoms experienced; diary of relaxation kept by patient; patients telephoned each week to ensure compliance; day of admission pulse, blood pressure, respirations and self-rating of anxiety and symptoms experienced; following surgery amount of LA noted, surgeon assessed anxiety level; patient self-rating of pain and anxiety	No significant difference between the two groups. Once the surgical procedure had begun the patients reported that it was difficult to utilise the relaxation techniques previously learnt. However, the experimental group reported their highest level of anxiety prior to entering the research study and that the guided relaxation had reduced their anxiety several days prior to surgery. The control groups experienced their highest level of anxiety on the day of surgery and afterwards

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Edwards et al. [17]	40 Patients undergoing GA for diagnostic laparoscopy (DL) and 40 patients undergoing GA for laparoscopic sterilisation (LS)	To evaluate the effectiveness of pain relief following laparoscopic surgery	Random allocation to one of four conditions—DL, DL plus NSAID, LS and LS plus a NSAID	Post-operative time taken to open eyes and to state name and address; self rating of pain once immediately on ward, at 1 h and before discharge; level of analgesia required noted and also questioned about discomfort on discharge; questionnaire given for return via post concerning morbidity in first 48 h	Significantly greater level of pain experienced by laparoscopic sterilisation in comparison with diagnostic laparoscopy at 1 h post-operatively. No significant difference at 24 h. Pain limited activity for both groups 24 h after the operation. Incidence of morbidity at 24 h was high although no difference between the four groups. NSAID made no significant difference to the level of pain experienced. 70% still preferred discharge on same day
Fenton-Lee et al. [18]	463 Patients undergoing GA/LA for a variety of surgical procedures	To assess patient acceptability of day care and outcomes following surgery	Questionnaire given on discharge; liaison sister to visit	NHS questionnaire concerning experience of surgery; wound assessed at 1, 7 and 30 day post-operatively by liaison sister; audit repeated 6 months later	Analysis of two audits reveals pain to be a problem. Written information supported by the visits from the liaison sister well received as 86% of patients satisfied. Wound complication rates were reduced when senior registrars operated and also when dedicated units were utilised
Firth [19]	813 Patients undergoing GA/LA for general and orthopaedic surgery	To evaluate pain management following discharge	Questionnaire given on discharge for return via post after 48 h	Questionnaire contained 16-items requiring all Yes/No answers concerning level and management of pain	63% stated that they were not made aware prior to surgery of the possible pain and 87% had not purchased medicines for pain relief. 51% were not given advice about pain management and 22% were unable to sleep on the first night. 31% only achieved partial or no relief with prescribed/recommended analgesia. Better written information required

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Frisch et al. [20]	23 Patients undergoing GA for either carpal tunnel release arthroscopy, tubal ligation or dupuytren's release, and 22 helpers	To obtain a picture of patients' and helpers' experience of recovery at home	Separate questionnaires for patient and helper given on discharge for completion and return via post after 1, 2 and 7 days post-operatively; telephone calls on days 2 and 7; one of the 16 pairs (patient or their helper) contacted after 3 months	Questionnaire concerned morbidity, anxiety on a 9-point visual analogue scale, degree of pain on a 6-point visual analogue scale and level of activity; telephone on day 1, 2 and 7 to remind subjects to complete questionnaire and enquire about recovery progress; telephone call at 3 months to ask about resumption of normal activities	86% reported one or more symptom after 24 h and 82% at 48 h. Most frequent complaint weakness and fatigue. Pain worst on first day for 40% of patients. Tubal ligation patients reported greater morbidity. Day of surgery most anxious period for 56% of patients and 32% of helpers. More than 30% required assistance from their helper i.e. dressing, bathing, etc. Three themes emerged from the telephone calls: (i) problems of morbidity; (ii) need for helpers' presence; and (iii) previous surgical experience gave realistic expectations. Helper' reports generally matched patients'. After 3 months 10% still experiencing difficulty with usual activities. Recommends better teaching concerning pain management, recovery rates and greater emphasis upon generally education
Gaberson [21]	46 Patients undergoing GA/LA for a variety of surgical procedures	To investigate the effects of humorous and musical distraction on anxiety levels	20 Min after admission random allocation to one of three conditions: (i) musical auditory distraction; (ii) humorous auditory distraction; (iii) no auditory distraction; all tapes 20 min duration	Self-reported rating of anxiety immediately following auditory distraction	No significant differences were found between the anxiety level of the three groups. Suggests that an element of choice be used in future researched studies on distraction
Gamotis et al. [22]	84 Patients undergoing day surgery and 99 patients undergoing in-patient surgery	To compare satisfaction with surgical care between in-patients and out-patients	In-patients completed questionnaire while in hospital and day case patients returned questionnaire via post	Self-reported ratings of satisfaction on questionnaire which examined three areas: (i) technical–professional relationship; (ii) education relationship; (iii) trusting relationship	Out-patients were significantly more satisfied with their nursing care. In-patients were least satisfied with the instructions given by the nurses. Significantly higher trusting relationship rating given by female in-patients

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Ghosh et al. [23]	557 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate satisfaction with care and level of contact with community services during the first 48 h.	Patients given questionnaire on discharge for return via post	Self-reported ratings of satisfaction which examined out-patients service, admission procedure, day surgery unit, quality of information, pain management and recovery	70% Satisfied with information provision. Main postoperative problem was pain management. 2.5% had to contact the hospital within 24 h, 4.3% their GP within 48 h and 1.4% their district nurse. Patients main concerns regarding their care were lack of information, lack of privacy, pain and waiting in the day surgery unit. Recommends staggered arrival times
Goldmann et al. [24]	52 Patients undergoing GA for various gynaecological procedures	To assess the effectiveness of information provision and hypnosis on pre and post-operative anxiety	Information provided by anaesthetist then 8 min structured interview to test knowledge provided by the anaesthetist; patients then randomly allocation to one of two conditions: (i) short general discussion; (ii) 3 min of hypnosis	Self-reported ratings of anxiety following information provision from anaesthetist then again following testing of knowledge and discussion or hypnosis	36% Reported no knowledge of their operation, 21% poor, 15% some and 26% a fair to good level of knowledge. 29% describe talk with anaesthetist as poor, 30% fair, 32% good and 9% excellent. 47% were dissatisfied with the explanation of anaesthetic procedures although 38% were happy. No significant difference in anxiety between groups prior to surgery although significant mean score difference for hypnotised group on one anxiety measure
Guilbert et al. [25]	100 Patients undergoing LA for the termination of pregnancy	To evaluate satisfaction with care at a family planning clinic	1 h After operation prior to discharge questionnaire completed	Self-reported ratings of social support, physical and emotional health, experiences during surgical procedure, adequacy of preparation, expectations and satisfaction with health care staff	56% Were very satisfaction with the surgical procedure and 31% moderately. Satisfaction was high for accompanied women. Preparation was the most important predictor of satisfaction. Wider mode of information provision recommended

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Gupta et al. [26]	290 Patients undergoing GA/LA for a variety a surgical procedures	To evaluate patient satisfaction with the anaesthetic care	Short questionnaire on admission and then one prior to discharge	First questionnaire contained 10-items requiring Yes/No responses concerning transport, anxiety and information; second questionnaire contained ten-items requiring Yes/No responses concerning transport, anxiety, social support, morbidity and satisfaction with care	62% Were anxious about their operation. 50% wanted an anxiolytic. 4% drove home. Commonest complaint (20%) was unrelieved pain. Low incidence of complications when local or regional anaesthesia used. 32% went home unaccompanied by an adult. 25% were alone during the first 24 h and 8% alone during the first 24 h without an adult to look after the children. Recommends greater emphasis on relieving anxiety and information provision
Harju [27]	70 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the satisfaction of patients following surgery	3 Months after discharge questionnaire sent for return via post	Questionnaire contained four items —expectations prior to surgery, did treatment correspond with expectations, evaluation of treatment and further suggestions	96% Would undergo day surgery again. Care considered very good by 56–62%, good by 31–40% and satisfactory by 1–6%. Suggested by patients that waiting time to admission date be reduced if their problem prevented them from working and more operations within each surgical speciality be available
Hawkshaw [28]	1008 Patients undergoing GA/LA for a variety of surgical procedures	To determine the level of satisfaction with care	24 h After surgery patients telephoned and questionnaire completed	Questionnaire contained several items relating to post-operative morbidity, information provision and general satisfaction with care	Satisfaction with pain relief—22% excellent, 44% good, 9% fair and 5% poor. 26% were not satisfied with the information received. Patients required more information regarding the degree and duration of surgical disability. The survey was viewed by many patients as a valuable part of their care. Recommends the use of telephone follow-up service to evaluate satisfaction with care

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Icenhour [29]	150 Patients undergoing GA/LA for a variety of surgical procedures	To determine the level of satisfaction with care	30–35 Min interview after surgery at the time of discharge	Questionnaire evaluated nurses' emotional support, doctors emotional support, staff willingness to listen and understand, and sufficient time with staff	96% Were very satisfied with care. Discharge information better when relative present immediately prior to discharge. Information provision seen by some patients as difficult to understand and/or assimilate because of the rapid patient turnover
Jamison et al. [30]	40 Patients undergoing GA for laparoscopic surgery	To determine preference for day care and assess recovery rate	Booked for day surgery then provided with an information booklet by the surgeon; pre-operative questionnaire pack sent out via post prior to admission for completion on the eve of surgery; post-operative questionnaire pack given on discharge for return via post	Pre-operative questionnaire pack—ratings of mood, fears and concerns, outcome expectancy, anxiety and symptoms checklist; post-operative questionnaire pack—ratings on pain and discomfort, weakness, disorientation, anxiety, depression, irritability and misgivings; this questionnaire to be completed for the first 3 post-operative days; a brief telephone interview conducted after 1 month; surgeon's rating of anxiety and recovery prospects	Overall 97% of patients demonstrated a preference for day surgery. Patients holding more negative feelings concerning their recovery did experience a slower recovery. Increased anxiety and lower mood also correlated with a slower recovery. Indices used significant predictors of psychological and physical recovery from surgery. Surgeon's rating of anxiety and recovery prospects correlated well with patients' ratings. Patients who are more anxious pre-operatively are prone to more complications following day surgery
Kelly [31]	103 Patients undergoing GA/LA for a variety of surgical procedures	To assess compliance with instructions, community service utilisation and post-operative morbidity	1 Week after surgery patients sent a satisfaction questionnaire for return via post	Questionnaire contained 11-items requiring mainly a Yes/No response and related to transport home, social support, pain and its management and contact with GP	Main problem first night drowsiness (43%) and headache (39%). 7% drove cars either home from the hospital or later that night. 5% had to visit their GP within the first week. Patients took between 1–6 or more days to resume normal routine

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Kempe et al. [32]	60 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the effects f two methods of pre-operative preparation on anxiety levels	Prior to admission patients randomly divided into one of two conditions: (i) telephone call eve of surgery, written and verbal information the day of surgery, follow-up telephone call day after surgery; or (ii) normal ward routine; following admission all subjects completed anxiety questionnaire	Questionnaire contained a brief self-reported rating of anxiety	Group that received telephone calls and written information were significantly less anxious. Asserts that the patient's with lower levels of post-operative anxiety will be more satisfied with care. More research studies required to examine anxiety at differing times
Kennedy [33]	70 Patients undergoing GA/LA for a variety of surgical procedures	To identify problems following surgery and the use of community services	Questionnaire sent out following discharge for return via post	Questionnaire contained two items: (i) did you need to contact the hospital/GP; (ii) if so for what reason	First night 29% slept less well than usual, 6% very poorly and 6% hardly at all. 93% had no post-operative morbidity problems. 7% contacted the hospital during first three post-operative days and 7% their GP regarding pain, bleeding and wound care. Only small workload therefore placed upon community services
King [34]	332 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate satisfaction with care and the health care environment	Questionnaire given on discharge for return via post	Questionnaire contained items relating to: (i) information provision; (ii) evaltion of the environment; (iii) evaluation of the staff; and (vi) help required from community services	30% Did not receive any written information. 90% were satisfied with the environment. 97% satisfied with discharge information. 5% had to contact community services within the first 24 h regarding pain, bleeding and wound care
Kleinbeck et al. [35]	19 Patients undergoing laparoscopic cholecystectomy	To establish patient's definition of recovery and the experience of recovery	Telephone interview 2nd day after surgery and 4/5th day after surgery; 20/40 min duration	Semi-structured tape-recorded interview concerned present physical ability/inability, problem management, expectations and concerns	All patients were discharged within 24 h of surgery. Patients felt vulnerable going home. Recovery was defined by patients as no symptoms and back to usual activities. One theme 'toward a usual self' with 2 patterns—progressive activity and self-management. Majority of patients (80%) felt 80% recovered by day 4/5. Much trial and error recovery because of lack of relevant information i.e. information adapted to recovery in the home. Telephone follow-up calls recommended

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Lewin et al. [36]	250 Patients in 1st audit and 287 in re-audit; patients undergoing GA/LA for a variety of surgical procedures	To establish the effectiveness of post-operative pain management	Telephone questionnaire conducted 48–72 h following discharge	Questionnaire contained eight-items requiring mainly Yes/No answers and concerned level of pain in first 24 h, management, contact with GP/hospital, satisfaction with management and information provision	Standards for pain management set and 90% of patients achieved the standard although only 43% happy with prescribed analgesia. Gynaecological patients experienced most dissatisfaction. Only 70% of patients received information concerning pain management. Recommends pre-packed analgesia, improved pain management information to accompany the analgesia packs and encouragement to use on-call telephone service
Lisko [37]	Four patients undergoing GA for laparoscopic gynaecological surgery	To determine if well informed patients are better equipped to care for themselves upon discharge	Pre-test prior to viewing of 8 min video-tape concerning self-management of care followed by a post-test;	Pre and post-test identical; seven questions all relating to self-management of care	No significant differences were established on the pre and post-test although the patients gave favourable comments. A larger study using a control group was recommended
MacAndie et al. [38]	101 Patients undergoing GA for ENT surgery and 59 GP's	To establish patient and GP satisfaction with day surgery	GP's sent questionnaire if their workload was affected by day surgery and ENT day surgery; telephone interview of patients following their discharge	GP questionnaire concerning workload associated with day surgery and ENT day surgery plus general comments; patient telephone interview contained eight-items requiring Yes/No response and concerned pain management, GP contact and information provision	37% Of GP's had no ENT patient consultations and 73% said present analgesia sufficient. 90% thought telephone help line would reduce consultations and that patients should remain hospital responsibility for 48 h. 70% of patients preferred day surgery. 16% considered pain relief poor following discharge. 20% stated discharge information excellent and 50% good. Patients though day surgery was minor surgery and were surprised at walking to theatre. Recommends improving information provision, analgesia provision sick leave cert. Provision and telephone help line

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Mackenzie [39]	164 Patients undergoing GA for a variety of surgical procedures	To identify anxious patients and their level of anxiety	First brief questionnaire at the time of booking and second questionnaire prior to surgery on the day of operation	First questionnaire contained four-items all relating to previous anaesthetic experience; second questionnaire contained two self-ratings of anxiety; nurse ratings of patients anxiety	Anxiety ratings on admission were higher than on the day of booking. Female patients, patients undergoing oral surgery, patients having their first anaesthetic and patients with previous unpleasant experiences of anaesthesia were more anxious. Main cause of anxiety was the operation, anaesthetic, both or neither. 19% wanted an anxiolytic. Nurses' reporting of anxiety level correlated well with the patient's rating. High anxiety at booking strongly indicated those most anxious on the day of operation and needing most help
Male [40]	118 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the need for pre-medication in day surgery	Questionnaire on admission, in the anaesthetic room then again prior to discharge; nursing staff completed brief questionnaire	Patients questionnaires were visual analogue measures of anxiety; nurse questionnaire a three point anxiety scale	Anxiety greatest in anaesthetic room. Female patients and patients undergoing local anaesthesia had higher self-rating scores. Nurses rating of anxiety correlated poorly. 14% of patients would have preferred an anxiolytic
Markland et al. [41]	31 Patients undergoing GA for a variety of surgical procedures	To determine the effectiveness of guided relaxation prior to anaesthesia	Questionnaire on admission and again in the anaesthetic room; 40 min prior to anaesthesia random allocation to one of three conditions—tape-recorded relaxation, tape-recorded short story (relaxation-control) and hospital radio; each tape 21.5 min; physiological rating, anaesthetic measures and difficulty of induction	Self-rating of anxiety questionnaire on admission and again in the anaesthetic room; physiological measures—pulse and blood pressure; anaesthetic measures—amount of induction agent required, time taken for induction and maintenance dose required; anaesthetist's rating of difficulty of anaesthesia on a visual analogue scale	The relaxation tape group had lower self-ratings of anxiety, required less time to be induced and required a lower maintenance dose. However, this type of distraction may only help the patient who is highly anxious on admission. The attention-control group also required less time to be induced and required a lower maintenance dose. It is therefore possible that some patients may benefit from distraction per se and not simply relaxation treatment. However, there were no differences in the anaesthetists' ratings of difficulty of maintenance of anaesthesia between the attention-control group and the no-treatment group

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Marquardt et al. [42]	203 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the effectiveness of pre-packed take-home analgesia	Telephone questionnaire conducted 48–72 h following discharge	Questionnaire contained nine-item requiring mainly Yes/No answers and concerned level of pain in first 24 h, management, contact with GP/hospital, satisfaction with management, information provision and side-effects of drugs	50% Gained only partial relief from their pain. 57% did not receive any information regarding pain management. 7.4% experienced sleep disturbance as a result of pain. 1.5% had to contact their GP regarding pain management. Pre-packed take-home analgesia, varied according to the operation type, may help to establish more effective pain management
Mealy et al. [43]	53 Patients undergoing GA/LA for a variety of surgical procedures	To gauge the effectiveness of a β-blocker (propranolol 10 mg) on anxiety levels	Random allocation to one to two groups prior to admission β-blocker eve of surgery or placebo eve of surgery; questionnaire on discharge and again after 24 h	Self-ratings of anxiety, pain and satisfaction prior to discharge then again 24 h later for return via post; physiological measures—blood pressure and pulse on admission then 2 and 4 h post-operatively	Mean blood pressure lower in β-blocker group prior to operation. Anxiety rating lower at time of discharge in β-blocker group. Recommends use of β-blocker agent for effective reduction of anxiety in day surgery
Michaels et al. [44]	17 Matched pairs of patients undergoing GA for inguinal hernia repair	To compare day case s. in-patient satisfaction with hernia repair	3–6 months Following operation a single page questionnaire sent out for return via post	Brief questionnaire concerning waiting list time, morbidity, use of community services, recovery time and satisfaction	Day surgery patients had a significantly shorter waiting list time. Mean in-patient stay 3 nights. No difference in recovery times as both groups returned to work after approx. 5 weeks. Day case patients had to contact their GP. more times and had complications not known to the hospital. 74% preferred in-patient surgery. Changes to work practices may be required for day surgery to be effective
Mitchell [45]	150 Patients undergoing a GA for gynaecological surgery	To establish a possible link between locus of control and desired level of information	Patient questionnaire 0.5/1 h prior to anaesthesia	First questionnaire concerned self-ratings of locus of control and second questionnaire 14-items concerning preferred level of preparatory information	No correlation established between locus of control and information requirements. Patients' fears were the anaesthetic, being unconscious and possible pain. Recommends differing levels of information sent to patient prior to the day of surgery and greater social support on the day of operation

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Nkyekyer [46]	100 Patients undergoing IV sedation for gynaecological laparoscopic surgery	To establish satisfaction, morbidity and methods of improvement of care	Questionnaire provided 2 weeks after operation at follow-up hospital visit	Questionnaire concerned information provision, treatment, pain, recovery time and morbidity	29% Required more information. 34% found the wait prior to surgery too long. 60% saw unconscious patients and of these 36% were made more anxious by this. 14% experienced pain during the procedure. 47% did not feel well enough to be sent home. 52% would have preferred an overnight stay. Problems within the first 24 h—abdominal pain (45%), shoulder pain (26%) and vomiting (22%). 5 days was average number to return to normal
Nyamathi et al. [47]	41 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate the effect anxiety may have upon patients' cognitive abilities	Two questionnaires 2 h prior to anaesthesia	Questionnaires consisted of a self-rating of anxiety and a critical thinking test with 100-items relating to their human reasoning abilities	25% Had high pre-operative anxiety scores. 70% of patients with high anxiety also had a low critical thinking performance and of the patients with low anxiety scores, 55% had a low critical thinking performance and of the patients with low anxiety scores, 55% had a low critical thinking performance. High anxiety patients will therefore have difficulty comprehending information and instructions. Gynaecological patients had significantly higher anxiety scores.

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
O'Connor et al. [48]	448 Patients undergoing GA/LA for a variety of surgical procedures	To assess patient satisfaction with care	Given a questionnaire on discharge for return via post in 1 week	Questionnaire (5 pages) concerning waiting list time, information provision, rating of standard of care, discharge instructions, recovery and role of carer	Mean waiting list time 1 month. Only 13% received written information while 89% received verbal information. 45% reported their experience as less worrying than expected and 42% said it was about the same as expected. 12% would have preferred an overnight stay. 46% spent 2/4 hours in the ward following their procedure. 2% of patients drove home. 23% received a telephone follow-up call. 62% had a carer for 1 day or less and 20% for 1/2 days. Problems–11% had to wait too long from admission to anaesthesia, 11% lack of post-operative feedback of results, 8% lack of information on what to expect during recovery
Oberle et al. [49]	294 Patients undergoing GA/LA for a variety of surgical procedures	To determine patient information requirements and if these were being met	Telephone interview of the 4th post-operative day	Questionnaire concerned post-operative morbidity ratings on a five-point scale, problem-solving actions undertaken, information requirements and expectations	Mean pain scores were moderate to high on the day of operation. Most expected pain but were surprised by the intensity. 36% reported trouble dressing themselves. A large number were dissatisfied with the timing of information provision, i.e. day of surgery. 25% received little or no information and many waned more detailed written information for home use. Only 30% stated that their expectations were met. Day surgery was viewed as minor surgery. Patients have differing information requirements

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Otte [50]	Eight patients under-going GA for ENT surgery	To examine patients' experiences and views of care	Letter sent following discharge requesting volunteers; ≈3 weeks after operation interviewed at home	Semi-structured tape recorded interview where patients were encouraged to reflect on their experience, discuss feelings, observations, expectations and involvement in the decision making process. 35/45 min duration	Four constructs emerged—importance of planning, fear of unknown, improving the service and value of day surgery. Patients were all unprepared in terms of information provision and educational support. Anxiety was increased while waiting in the ward for surgery. Lack of time was seen as a major communication problem Recommendations—increased level of information, staggered admission times, increased continuity of care with the day unit, increase communication with community services and a change of culture within the hospital, i.e. promotion of empowerment
Parsons et al. [51]	19 Patients undergoing GA for a variety of surgical procedures	To identify nursing behaviours perceived as caring	Prior to discharge patients were given a questionnaire to complete	Questionnaire concerned identification (in own words) of caring nursing behaviours then ranking the order of caring nursing behaviours from a given list of 63 caring behaviours	Caring behaviours ranked and placed into categories. Categories in rank order: (i) nurses know what they are doing; (ii) nurses treat the patient as an individual, (iii) nurses make patient feel as an individual, that they are there if needed; and (iv) nurses give patient full attention when they are with them. Top 3 individual caring behaviours—reassuring presence, verbal reassurance or expression of concern and attention to physical comfort
Philip [52]	1511 Patients undergoing GA/LA for a variety of surgical procedures	To evaluate patient satisfaction with care	Brief questionnaire sent out on a postcard following discharge	Questionnaire contained five-items requiring mainly Yes/No responses and concerned morbidity, experience of anaesthesia, recovery rate and general satisfaction	73% Experienced nausea in the first 24 h and 92% vomiting. The highest reported problems of morbidity related to laparoscopy. 38% of patients were able to return to their normal activities the following day and the remaining 62% took 3.2/2 days to recover. Recommends greater use of postal satisfaction questionnaires

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Pineault et al. [53]	182 Patients undergoing GA for hernia repair, tubal ligation or-meniscectomy	To compare day surgery and in-patient surgery in terms of patients satisfaction and clinical outcome	Random assignment to day or in-patient surgery; first interview at home 7 days after surgery; telephone interview 1 and 3 months after surgery	Home interview concerned satisfaction, morbidity and personal cost; telephone interviews utilised the same format; data concerning hospital and medical costs	54% Of day surgery patients thought their stay was too short as opposed to 21% of in-patients. No significant difference in complications or morbidity. Costs were significantly higher with in-patients for tubal ligation and hernia but not for meniscectomy. 50% would undergo day surgery again
Pollock et al. [54]	100 Patients prior to surgery and 426 following surgery; all were undergoing GA/LA for a variety of surgical procedures	To evaluate patient satisfaction with nursing care	Normal ward routine	Pre-operative questionnaire concerning the checks made and information provided; the post-operative questionnaire concerned their experience of surgery and the first 2 weeks of recovery	87% Were satisfied with day surgery. 10% said that their home circumstances were not checked in detail prior to admission. Following admission 20% had to wait >3 h for their operation. Patients given the least information were the most dissatisfied. 66% were given no written information about their operation. 16% left the hospital with questions unanswered. 33% were on their own at home in the first 24 h. 50% stated that they were still in pain 1 week after the operation and 56% had no written information concerning pain management
Ratcliffe et al. [55]	65 Patients undergoing gynaecological laparoscopic surgery	To evaluate the effectiveness of drug combinations on morbidity and patient satisfaction	Oral pre-medication; post-operative rating at 30 min, 1 h and then hourly until discharge; anaesthetic ratings; patient questionnaire given on discharge for return via post	Post operative ratings of nausea and vomiting, abdominal pain and shoulder tip pain; visual analogue scale for pain rating; anaesthetic rating, i.e. drugs, dose, duration, time to wake and time to discharge; patient questionnaire concerned morbidity ratings for first 3 days	Pain became worse once at home and 75% required analgesia. After 3 days 71% not back to normal, 72% abdominal pain, 31% should pain and 12% drowsiness, headache, sore throat. Concludes that laparoscopic surgery still has considerable post-operative morbidity although only 8% said they would have preferred an overnight stay

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Read [56]	211 Patients undergoing GA/LA for a variety a surgical procedures	To determine the level of patient satisfaction	2/3 weeks Following surgery patient sent questionnaire for return via post	Questionnaire contain open and closed questions on all aspects of care plus an overall satisfaction rating	47% Rated their experience as excellent. Most were satisfied because of minimal disruption, no overnight stay and convenience. 88% stated that information received was adequate although 43% wanted more information. 24% reported problems following discharge, i.e. pain, nausea and vomiting. The main problem related to the period of waiting following admission
RSC & East Anglian (1995) RHA [57]	1073 Patients undergoing GA/LA for a variety of surgical procedures	To determine patient expectations prior to surgery	Questionnaire sent to patient with admission details prior to surgery	Questionnaire concerned information provision, assessment, expectations and social arrangements	Only 53% had pre-assessment check. Only 11% perceived a choice between day surgery and in-patient surgery. 66% did not receive information covering whole process of day surgery. 67% were satisfied with the information. 35% wanted partner to be involved in discussion. 20% were unable to state accurately their surgical procedure. 40% were unable to state level of expected pain. 22% were anxious about anaesthetic and 18% the operation. 31% were admitted within 1 month. Conclusion pre-operative information often inadequate
	361 Of the above patients	To determine patient experiences following surgery	Questionnaire sent to patient 3 weeks after surgery	Questionnaire concerned morbidity, recovery at home and general satisfaction	75% were satisfied with day surgery. 64% experienced little or no pain in first 24 h, 10% a great deal. 20% experienced more severe pain than expected. More than a third required a great deal of support from helpers at home. 20% of carers required time off work. 48% utilised one community health service. Main sources of dissatisfaction car parking, boredom, effects of anaesthetic, lack of privacy, length of stay, pain control and discharge warning

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Rudkin et al. [58]	826 Patients undergoing GA/LA for a variety of surgical procedures	To review possible differences in patient outcome between three facilities	Data collected by staff during admission period then 24 h later by telephone interview	Recordings of patient information, operation, anaesthesia, waiting time, recovery time and discharge; telephone questionnaire concerning opinions of information provision anaesthesia, surgery, waiting times and overall management of care	Mean waiting time in dedicated facility 102.8 minutes and in-patient mixed recovery 144.8 min. 2.7% thought the dedicated facility wait too long and 10.2% the mixed in-patient recovery too long. Information from the dedicated unit concerning anaesthesia, surgery and general day surgery information all evaluated better than the mixed in-patient facility. Concludes that cost and efficiency savings can be made from the use of dedicated units
Sigurdardottir [59]	72 Patients undergoing GA/LA for a variety of surgical procedures	To compare satisfaction with care between two facilities	Questionnaire sent 2 weeks after surgery for return via post	Satisfaction questionnaire contained 25-items divided into three sections relating to nurses' technical ability, teaching ability and inter-personal skills; five-point rating scale for each item plus room for brief comments	The majority of patients were satisfied with their care. Patients were least satisfied with the educational or teaching sub-scale. Little written information was provided. More emphasis required on written information and good instruction

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Singleton et al. [60]	33 Patients undergoing GA for laparoscopic cholecystectomy	To investigate the suitability of day case cholecystectomy	Pre-operative home visit; ratings of post-operative morbidity by staff; telephone questionnaire on first day and 2 weeks; follow-up visits by district nurse (DN)	Pre-operative home screening visit by DN; pain score on verbal analogue scale four times in recovery area, once on ward again prior to discharge; morbidity rating on a four-point scale. Visit on 1st post-operative night by DN—wound and morbidity information recorded; similar DN visit on following day; telephone questionnaire 1st day recorded satisfaction with care and morbidity; telephone questionnaire after 2 weeks recorded use of community services, morbidity, need for carers and recovery times	79% Were happy to have day surgery because of convenience, comfort and privacy.21% would have preferred 1 night in hospital. Mean time to sit out of bed 43 min and mean time ready for discharge 272 min. 42% required IV analgesia during immediate recovery, the others oral analgesia. 73% also required additional IV antiemetics. Nausea remained a problem on day 1 for 30% and day 2 for 15%. Mobilising from the bed day 1–21%, day 2–79% and day 3–94%. Returning to normal activities day 7–15%, day 15–85% and day 20–94%. 42% required the help of a carer. District nurses visited 3.3 occasions on average. 21% contacted GP in first 2 weeks for wound care advice or analgesia. 79% rated management as very satisfactory and 15% as satisfactory
Stephenson [61]	28 Patients undergoing GA for orthopaedic surgery	To determine a criteria for discharge from day surgery	Questionnaire given during admission for completion every 0.5 h post-operatively during hospital stay and for the first 24 h at home	Self-rating questionnaire on a ten-point scale for alertness, energetic, headache, clearheadedness, quick-witted, pain and anxiety; room was also available for brief comments; questionnaire given on discharge concerning behaviour in first 24 h on a ten-point scale	No patient was fully alert after 30 min. 57% experienced drowsiness in first 24 h. 21% experienced headache in the immediate post-operative period and 35% following discharge. 50% were aware of reduced cognitive abilities during first 24 h. 37% experienced lack of co-ordination. 43% were only moderately active on the 2nd day. 64% took analgesia at home. From the data and literature an essential/desirable discharge criteria was established concerning mental state, mobility, pain, eating, elimination, information and social factors

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Thatcher [62]	Four patients undergoing GA for orthopaedic and general surgery	To investigate patients' experiences following discharge	Interviewed 2/4 days following surgery	Open-ended discussion in the patients home	Pain was a problem for all patients. Pain was expected but when analgesia did not bring relieve it was difficult to cope. One patient had to pay for analgesia so refused to have the prescription. Three patients anticipated nausea and vomiting but found it distressing. The media created anxiety about having a GA. All required help from carers and all resumed normal activities too quickly. Regaining autonomy was a crucial factor in their recovery. More information required regarding pain management and recovery process. One day surgery not one day recovery needs to be strongly emphasised
Vogelsang [63]	37 Patients undergoing GA for a variety of surgical procedures	To determine impact of continued contact with a familiar nurse during admission	Interviewed in pre-admission the random allocation to 1 of 2 groups on admission: (i) continued contact with pre-admission nurse or (ii) normal ward routine; telephone interview 3/5 days later by pre-admission nurse	Initial interview demographic data; continued contact group 5/10 min pre-operatively and 60/85 min post-operatively; telephone interview asked three questions concerning discharged time and a rating on five-point scale for satisfaction with nursing care	75% in continued contact group were ready to go home when discharged and 45% in control group. Nursing care was reported as excellent by 80% in continued contact group and by 40% in control group. Recommends continued contact will improve patient satisfaction with care and ease transition through the various phases of treatment

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Wedderburn et al. [64]	89 Patients undergoing GA/LA for hernia repair, varicose vein surgery or vasectomy	To evaluate patient satisfaction and establish the level of community service involvement	Patients divided into 2 groups: (i) out-patient appointment usually given; and (ii) no out-patient appointment usually given; questionnaire given on arrival for return via post in 2 weeks; telephone contact or visit by district nurse within 72 h	Questionnaire contained three-items requiring mainly Yes/No responses: (i) out-patient appointment not required; (ii) morbidity problems; and (iii) any continuing problems requiring an out-patient appointments	Of 84 patients not given out-patient appointment 60% stated that they would not have benefited from the hospital visit. 24% experienced minor problems which settled within 2 weeks and 19% visited their GP at least once (pain and wound problems). Only 7% of patients were satisfied with no routine hospital follow-up. Recommends good written information, routine telephone contact with first 24 h and option to have follow-up hospital visit
Wicklin et al. [65]	91 Patients undergoing GA/LA for a variety of surgical procedures	To compare the effects of two slightly differing video-tapes preparations on the level of anxiety	In pre-admission 1 week prior to surgery randomly allocated to one of three groups for pre-operative preparation: (i) factual video then anxiety rating; (ii) anxiety rating then factual video; and (iii) anxiety rating then personal video	Self-rating of anxiety questionnaire either before or after one viewing; factual video nurse describes various pre and post operative procedures; personal video a patient's eye view of the various pre and post operative procedures; both video-tapes contained the same information	No significant difference was established between the groups. Gender was the only significant result. Females rated themselves as more anxious than the males although this may have resulted from gender reporting differences. Some patients refused to take part in the study and they may have been the more anxious. One viewing of the video may also have been an insufficient number
Wilkinson et al. [66]	520 Patients undergoing GA for a variety of surgical procedures	To assess post-operative morbidity	Given questionnaire on discharge for return via post 48 h later	Questionnaire concerned presence of nausea, vomiting, sleepiness, pain, headache, sore throat, recovery rate and possible contact with GP	Mean anaesthetic time was 18 min (ranged 3/90 min). 55% reported one or more symptoms on returning home—38% pain, 30% sleepiness, 11% nausea. 60% of women and 38% of males affected. Study showed that females undergoing relatively long surgery had higher morbidity rates, i.e. 84% undergoing laparoscopic sterilisation reported symptoms. Improved methods of pain relief recommended. 9% contacted their GP

Table 1 (Continued)

Source	Sample	Purpose	Type of preparation	Measures	Findings
Willis et al. [67]	244 Patients undergoing GA/LA for a variety of surgical procedures	To ascertain patient satisfaction and the level of community service involvement	Questionnaire sent 2 weeks after discharge for return via post	Questionnaire concerned presence of nausea, vomiting, sleepiness, pain, headache, sore throat, recovery rate and possible contact with GP	79% stated they were satisfied with treatment. Significant correlation between receiving written information and satisfaction rate. 30% experienced a fair amount of pain in first 24 h, 9% a great deal. 64% required analgesia. 21% required help from carers. 10% of carers took an average of 3 days off work and 7% loss earnings. 43% required one or more community services although 13% of these were unplanned. Recommends improved information provision, improved pain management and a telephone advice service to avoid unplanned visits to GP

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Ambulatory Surgery 7 (1999) 101–106

Ambulatory Surgery

Improving patient throughput for oral day case surgery. The efficacy of a nurse-led pre-admission clinic

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Abstract

In an attempt to reduce patient failures and cancelled operations on the day of admission for oral day case surgery, and to improve pre-operative patient assessment and education, a nurse-led pre-admission clinic (PAC) was introduced in April 1996. Day case patients were selected in cohorts from the waiting list and invited to attend the pre-admission clinic prior to finalising their operation dates. Clinics were run by experienced staff nurses and patients screened for medical or surgical problems that might preclude day case surgery; access to experienced anaesthetic or surgical opinion was arranged as necessary. During a 2 year period 908 patients were sent clinic appointments, but only 727 (80%) attended; of these 629 (69%) progressed to surgery, but 98 (11%) were deemed unsuitable for day case treatment usually because of medical or socio-domestic complications and were managed more appropriately elsewhere. Of the 181 non-attenders, 140 were ultimately removed from the waiting list. Pre-admission screening thus filtered out 279 patients who were either unsuitable for day case surgery or no longer interested in receiving treatment. Waiting times for surgery were reduced from over 12 months to less than 3.

Keywords: Day surgery; Pre-admission clinic; Nurse-led

1. Introduction

The Oral Surgery Day Case Unit at Newcastle Dental Hospital provides surgical and dental treatment under general anaesthesia for a wide range of patients. Whilst the majority of patients are fit and healthy adults attending for elective dento-alveolar surgery (such as the removal of impacted third molar teeth), a significant proportion are referred for paediatric oral surgery, specialist dental care due to medical and physical handicap, or to provide treatment for patients with dental phobias.

During a clinical audit of general anaesthetic services in the Dental Hospital in 1996, a number of problems were identified:

1. A substantial waiting list for treatment had developed, with some patients having to wait up to 2 years for specialist care.
2. Patients called from the waiting list sometimes failed to attend on the day of surgery, resulting in wasted operating time.
3. Some patients were deemed unsuitable for day case general anaesthesia on the day of surgery because of complicated medical or social histories, or because of recent changes in their medical conditions.
4. Many patients attended for day case surgery with a poor understanding of the day unit admission and operating procedures, with an inadequate or inappropriate escort and with no suitable post-discharge travel arrangements.

In an attempt to overcome these defciencies, a nurse-led pre-admission clinic (PAC) was introduced in April

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1996 for all patients attending for day case general anaesthetic treatment in the Oral Surgery Day Unit. The aims of the clinic were the following.

1. To obtain an up to date medical history and improve anaesthetic assessment of patients awaiting surgery.
2. To prepare patients more fully for their day surgery attendance.
3. To reduce the number of patients failing to attend on the day of surgery, thereby optimising the use of theatre facilities and reducing waiting times.
4. To prevent avoidable cancellations of operations by identifying unsuitable patients well in advance of the proposed date of surgery.
5. To provide the opportunity for additional health education of patients, for example in relation to smoking and alcohol habits.

2. Method

The clinic was designed to be run by an experienced senior staff nurse working in the oral surgery day unit, but access to consultant anaesthetic and/or oral surgery advice was readily available, if required, from clinicians working nearby.

Day case patients, who had been seen in out-patient consultation clinics and then listed for elective dento-alveolar surgery under general anaesthesia, were selected in cohorts from the waiting list and invited to attend the PAC prior to finalising a date for their operation. The most common operative procedures were surgical removal of impacted third molars and the extraction of teeth and roots. Patients were informed that they could not proceed to surgery without satisfactory pre-admission clinic attendance, and indeed that failure to attend might ultimately lead to their removal from the waiting list.

Initially, five patients were booked per clinic, with a 30 min assessment slot assigned to each, although as staff gained experience ten patients could be seen during each session. The following protocol was adopted:

1. A medical history was taken from the patient using a standard day case anaesthetic assessment sheet (Table 1), particularly to ensure that the patient was still suitable for day surgery and that no significant change had occurred in their medical history between initial consultation and PAC attendance.
2. If the patient was accepted for day surgery, the nurse confirmed details of the general anaesthetic planned, the anticipated pre- and post-operative care, and any likely complications. A pre-operative advice sheet summarising this information and outlining appropriate fasting times before surgery was provided.
3. The patient was given the opportunity to ask any questions relating to their care as a day patient.
4. Finally, if all the agreed criteria were met, an appointment for day surgery, convenient for both hospital and patient was arranged.

3. Results

Table 2 and Fig. 1 summarise PAC activity during the 2 year period, April 1996 to March 1998 (inclusive), emphasising that out of a total of 908 patients invited to attend the clinic only 727 (80%) attended, whilst ultimately only 629 (69%) actually proceeded to day surgery.

Fig. 2 contrasts the fate of clinic non-attenders between the first and second years of clinic activity: of the 116 patients who did not attend between April 1996 and March 1997 (from the 411 sent appointments), 75

Table 1
Pre-admission clinic nurse questionnaire

Hospital number:	Height:
Name:	Weight:
Address:	Age:
	Sex:
	Occupation:

1. Have you ever had an operation before requiring a general anaesthetic?
If YES, please state year and nature of operation(s)
2. Did you have any problems with the anaesthetic?
3. Have you had any serious illness in the past?
4. Do you get chest pains (or suffer from angina)?
5. Have you ever had a fit or convulsion?
6. Do you have blackouts or faint easily?
7. Do you suffer from asthma or bronchitis?
8. If you have asthma, have you taken aspirin without ill effect?
9. Do you suffer from high blood pressure?
10. Do you suffer from arthritis?
11. Do you have any blood disorders?
12. Do you bleed badly, or bruise without cause?
13. Have you ever been jaundiced (turned yellow)?
14. Do you have kidney disease?
15. Do you have diabetes (sugar in the urine)?
16. Do you have any problems with heartburn or indigestion?
17. Do you have a hiatus hernia?
18. *If female*, are you or could you be pregnant?
19. *If female*, are you taking the contraceptive pill?
20. Do you suffer from back problems?
21. Have you any allergies (e.g. to drugs, Elastoplast, etc.)?
22. Are you on any regular medication (including inhalers)? If YES, please give details
23. Have you taken steroids (tablets or inhaler) within the last 6 months, even if you are not taking them now?
24. Do you drink alcohol? If YES, approximately how many units each week?
25. Do you smoke? If YES, approximately how many cigarettes each day?
26. Has anybody in your family (a blood relative) ever had any problems with anaesthetics or operations?

Table 2
Pre-admission clinic activity (April 1996 to March 1998)

	Number of patients sent for	Number attending PAC	Number of non-attenders	Number progressing to surgery
April 1996–March 1997	411	295	116	233
April 1997–March 1998	497	432	65	396

(65%) were removed from the waiting list, whilst 41 requested a further appointment. During the corresponding period in year two (April 1997 to March 1998) only 65 patients (out of 497 sent for) failed to attend and all of these were ultimately removed from the waiting list.

Fig. 3 illustrates the reasons why clinic attenders did not proceed to surgery, and demonstrates that 48% required further investigation, 24% were deemed unsuitable to be day case patients and were subsequently admitted for overnight stay, 19% were managed satisfactorily without general anaesthesia, and a further 9% no longer required surgery or were pregnant when called to the clinic. Fig. 4 contrasts these unsuitable patients during the first and second years of pre-admission clinic activity, and confirms that whilst 62 patients seen between April 1996 and March 1997 were not eligible for day surgery, this figure dropped markedly (to 36) during the following year. The most striking decrease was in the category of patients requiring investigation prior to surgery.

4. Discussion

The PAC has been shown to be highly successful in surgical practice, facilitating efficient operating theatre utilisation, and was recommended by the Royal College of Surgeons of England as an important surgical management tool [1]. It has now been successfully introduced in a number of surgical specialities, including oral and maxillofacial surgery, orthopaedics, general surgery and ENT [2–6]

Previous experience of a PAC for in-patient oral surgery within a university teaching hospital environment demonstrated a nearly 90% successful admission rate for surgery following PAC attendance and allowed identification and resolution of numerous medical or social problems which might have precluded surgery. It simultaneously allowed waiting list validation and a reduction in waiting times for operation [2]. Similarly useful results have also resulted from the use of PACS for paediatric otolaryngological surgery [6].

More recently, the concept of nurse-led PAC has become popular. Reed et al. [4] reported improvement in both patient satisfaction with pre-operative information and a reduction in cancelled operations due to unforeseen medical problems following the introduction of a nurse-led assessment clinic for general surgical procedures.

The nurse-led PAC at the Newcastle Dental Hospital deals with patients referred from three distinct hospital specialities for day case treatment: oral and maxillofacial surgery (the principal user), paediatric dentistry and restorative dentistry. It is within the latter two categories that many medically or physically handicapped patients, or those with severe dental phobias unmanageable by other treatment or sedation techniques, commonly present and often require complex and protracted clinical management.

An additional problem for dental hospital general anaesthesia services is a cultural one. Many patients, particularly infrequent attenders or phobic patients, perceive that ‘dental anaesthetics’ and oral surgery procedures are available immediately ‘on demand’ upon hospital attendance. Whilst this belief may often stem from the historic pattern of ‘chairside’ dental anaesthetics administered in general dental practice, there is also evidence to suggest that some confusion still exists in the minds of primary care clinicians over the appropriate referral mechanisms for modern day case anaesthesia in dentistry [7].

The nurse-led PAC acts as an important central resource where patients from a variety of backgrounds may be seen, informed, and educated in modern day surgery protocols and then appropriately managed in an efficient and professional manner.

During the 2 years analysed in this study, 908 patients were sent clinic appointments, but only 727 attended. During the first year of clinic activity, long waiting lists for treatment had built up and many patients were called after waiting in excess of 12 months. This may explain the higher number of patients, 28% that did not attend the clinic compared with only 13% who failed to do so during the second year.

In many cases the reason why patients failed to attend the PAC remains unclear, although amongst those waiting longest, change of address, resolution of acute symptoms, and having received alternative treatment elsewhere were common explanations.

Overall 629 patients proceeded successfully to surgery during the 2 year period; potentially 279 patient failures to attend on the day of surgery were avoided. Comparison between the first and second years of clinic

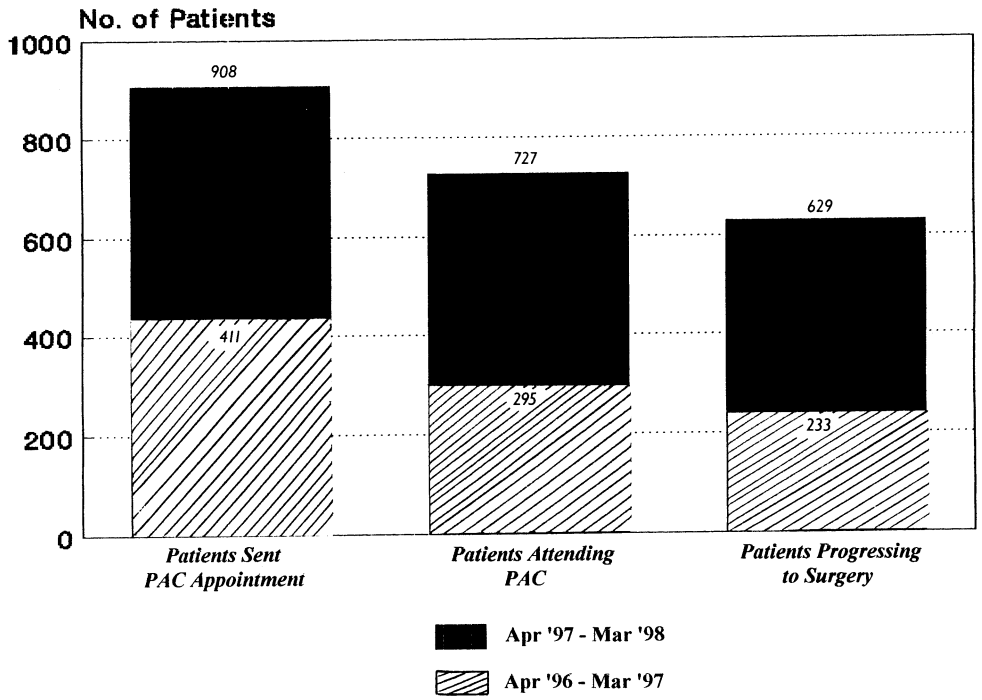

Fig. 1. The fate of patients sent pre-admission clinic (PAC) appointments.

activity again demonstrates a much higher percentage of patients proceeding to surgery in year two (396 out of 497 or 80%) compared with year one (233 out of 411 or 57%) presumably because of the shorter waiting times for treatment in the second year.

There is also a distinct difference in the fate of clinic non-attenders between the two years, with 100% of year two non-attenders removed from the waiting lists following failure to attend, whilst during the first year only 65% were removed with 35% given further clinic appointments. The fact that virtually none of the 35% of non-attenders ever attended or responded to clinic invitation ultimately allowed more efficient validation of the waiting lists during year two.

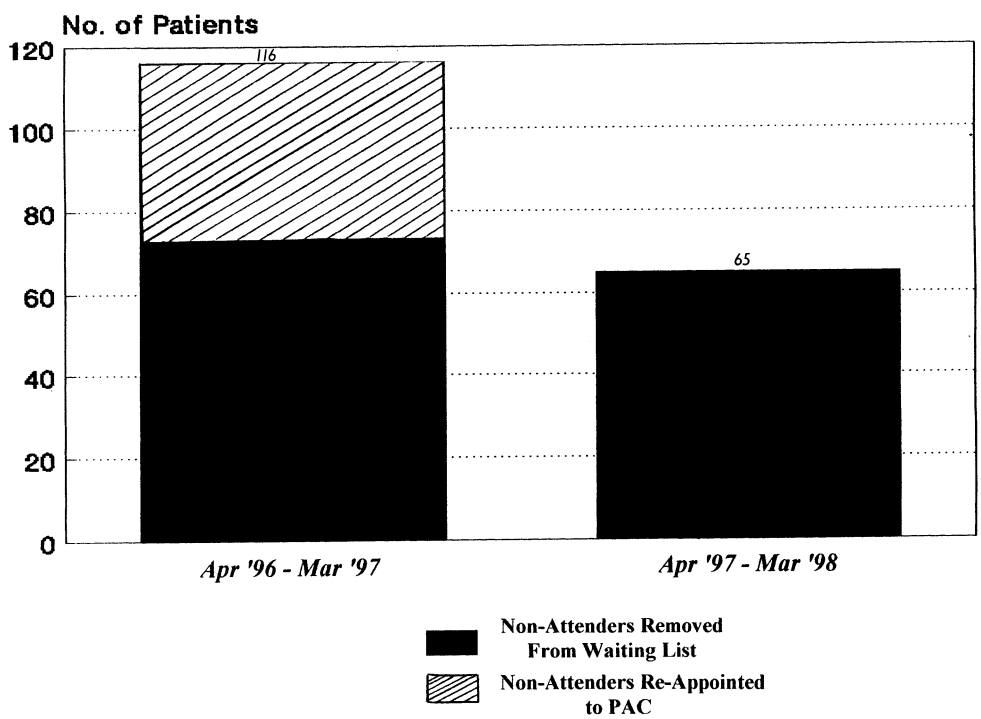

Fig. 2. The fate of PAC non-attenders.

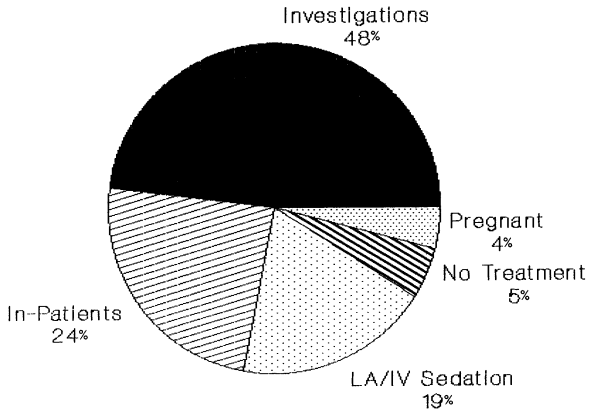

Fig. 3. Why do some PAC attenders not proceed to surgery?

It is interesting to note that 98 patients did not proceed to day stay surgery following pre-admission clinic attendance. In 48% of cases this was because the PAC protocol required further medical investigation to be carried out prior to surgery (usually haematological and biochemical tests, or an ECG). In a number of instances the patient's medical practitioner was contacted and asked to investigate a raised blood pressure or to answer queries relating to medication or the patient's previous medical history. During the second clinic year significantly fewer patients (14 compared with 33 in year one) required investigation prior to booking day surgery appointments, and it was felt that this improvement was due, in part at least, to PAC experience being fed back to clinicians.

Twenty four percent of patients (12 during year one, 11 during year two) were found to be unsuitable for day surgery due to socio-domestic problems precluding appropriate escort or post-operative care arrangements. It is disappointing that this small but persistent group of patients were not effectively identified and/or appropriately educated during initial consultation appointments, although their successful management at PAC obviously prevented avoidable cancellations occurring on the day of surgery.

Nineteen percent of patients were booked for surgery under local anaesthesia supplemented with intravenous sedation, rather than attending for day case general anaesthesia. During the first year, 13 patients were thus re-booked, reflecting their lack of awareness of suitable alternatives to treatment under general anaesthesia. During the second clinic year this figure had fallen to six, probably due to increased provision of intravenous sedation oral surgery sessions in the local anaesthetic department.

In both years there were small numbers of patients who either no longer required surgery or were pregnant when called to attend the pre-admission clinic. Whilst there are no appropriate means to select out this small sub-group, the pre-admission clinic again acted as a useful filter in preventing these unsuitable patients from receiving dates for surgery.

Although it was anticipated that there might be some resistance to a nurse-led clinic of this type, no significant problems emerged during the first 2 years of clinic activity and indeed, improved communication and better understanding between the clinicians and day unit nursing staff have led to substantial benefits in patient management, and an extended role for the nursing staff.

An occasional disadvantage arose when communica-

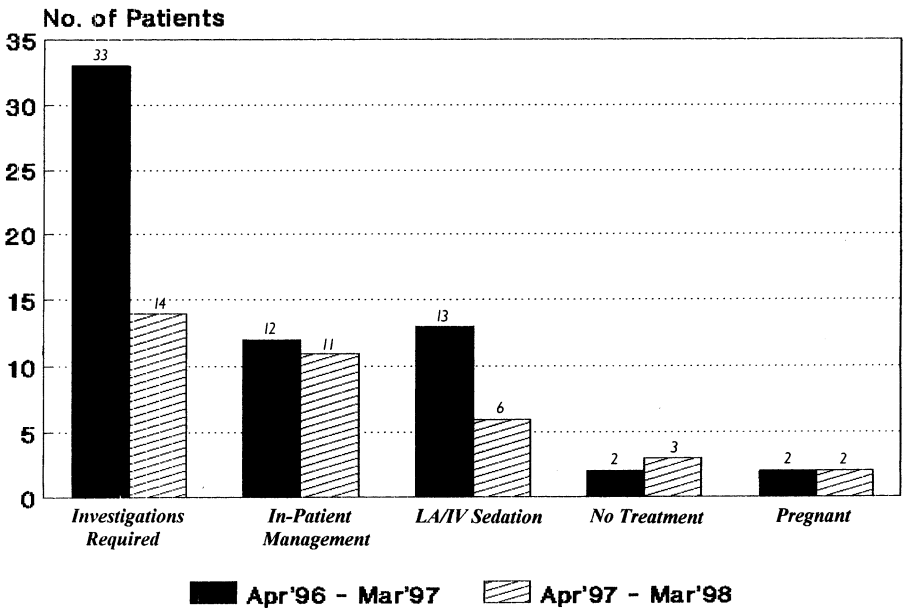

Fig. 4. Comparison of PAC attenders not proceeding to surgery between year one (1996/1997) and year two (1997/1998) of clinic activity.

tion with patients' general medical practitioners or other hospital specialists was required, as delays were inevitably introduced into the pre-admission process before surgery dates could be confirmed.

Overall the nurse-led pre-admission clinic has proved a successful and versatile tool in both the management and validation of day surgery theatre lists, and in improving the quality of patient care within a University Dental Hospital setting. From its initiation as a 3 month trial in 1996, it has become an integral component of clinical care in the day case unit.

Future developments of the clinic are planned, and include running the PAC alongside consultation clinics in oral and maxillo-facial surgery so that patients may be seen and booked for surgery directly following diagnosis and treatment planning. Proposals are also in hand to increase the number of clinics per week, and to audit patients' experiences of pre-admission by means of postal questionnaires post-operatively.

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Ambulatory Surgery

Implementation of ambulatory surgery in a university hospital: an audit comprising 873 general surgery cases

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Abstract

The Ambulatory Surgery Centre of the Lausanne University Hospital was established in 1995 as a multispeciality unit comprising general surgery, plastic surgery, otorhinolaryngology, orthopaedics and urology. In its first 3 years of activity 873 general surgery procedures were performed, including biopsies, laparoscopies, inguinal hernia repair and vein stripping. An audit of these cases revealed an overall morbidity of 1%, a rate of non-planned admissions of 0.6%, no re-admissions within 30 days, and that 95% of patients were satisfied with their care. These results demonstrate the feasibility of implementing ambulatory surgery in a teaching hospital and encourage the expansion of this practice.

Keywords: Ambulatory surgery; Hernia; Varicose veins; Proctology; Biopsy

1. Introduction

Ambulatory surgery is increasingly accepted and encouraged throughout the world by both government and private agencies [1–3]. It is now well recognised that it can achieve surgical results as good as inpatient care, and at lower costs [4,5]. This has led, in some countries, to more than 50% of elective surgery being performed on an outpatient basis [6]. Ambulatory surgery was formally introduced in Switzerland only rather recently. Scheidegger et al. [7] reported good acceptance by patients and surgical results comparable to inpatient series. This, combined with financial reforms in the Swiss health care system, stimulated the implementation of other centres of ambulatory surgery in Switzerland. The challenge now is to evaluate the effects of these changes, in order to define ways to improve the quality and efficiency of care delivered.

The Ambulatory Surgery Centre of the Lausanne University Hospital was inaugurated in April 1995. The unit is open for the specialities of general surgery, urology, orthopaedics, otorhinolaryngology and plastic surgery. Although there was no substantial change in the total number of patients referred to the hospital, a shift of cases from the traditional operating rooms to the ambulatory facilities has been observed. This study reviews the general surgery procedures performed during the first 3 years of activity at the centre.

2. Definitions

2.1. The Centre

The Ambulatory Surgery Centre is dedicated to procedures in the following categories: (1) Strictly 'ambulatory', when the patient does not need a bed (mostly local anaesthesia); (2) 'Same day', when admission and discharge are on the same day; and (3) 'One-day with night', when an overnight stay is required. Many patients benefit from a reimbursement package for 'one-day surgery', which covers all three categories. As Switzerland has an essentially liberal health care sys-

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Table 1
Contra-indications for surgery

Drug addiction, alcoholism
Cirrhosis (Child's B or C)
Severe psychiatric disorders
Coagulopathy
Unfavourable socio-economic conditions:
Living alone
Language problems
No telephone

tem, financial arrangements had been negotiated with insurance companies prior to opening the centre.

The facilities include two operating rooms, a seven-bed recovery room, a waiting room and an office. The Centre's permanent staff are formed by three recovery room nurses, one scrub-nurse, one nurse-anaesthetist, one circulating nurse and one administrative assistant. Surgeons and anaesthesiologists are assigned to the Centre according to schedules determined by their services.

2.2. Preoperative evaluation

Candidates for ambulatory surgery are evaluated once a week in the hospital's outpatient clinic. The patients are asked to complete a screening checklist designed to identify co-morbid and social conditions that may contra-indicate surgery. Table 1 summarises these contra-indications. A fully trained surgeon is responsible for confirming the indication and eligibility for ambulatory surgery. During the same visit, the patient is also evaluated by an anaesthesiologist. Preoperative laboratory testing is requested according to a pre-established protocol (Table 2). The patients are then given written preoperative instructions and the date and time for surgery. No premedication is prescribed.

2.3. Peri- and post-operative care

On the day of the operation, the patient stays in the recovery area before and after the procedure. He will return home the same day if the discharge criteria are fulfilled. These are essentially the acronym AAAAM: awake, analgesia, ambulating, alimentation and miction [10]. The patient must be taken home by someone, and have company during the entire first postoperative day. Written postoperative instructions and emergency numbers to call are given. Analgesics are provided for the first 24 h to avoid the need to stop at a pharmacy on the way home. If the criteria for discharge are not met, the patient is admitted overnight (one-day stay).

Standardised anaesthetic techniques and postoperative analgesic/anti-inflammatory drugs are used. When general anaesthesia is employed, the opiate of choice is alfentanyl, and diclofenac is administered by suppository at the end of the intervention. In hernia repair, local anaesthetic block with bupivacaine with adrenaline is added. For most cases, a mixture of tramadol and mefenamic acid is prescribed for postoperative analgesia.

The surgical techniques employed are based on well-established methods. For instance, the Shouldice technique [11] is used for inguinal hernia repair.

Patients undergoing varicose vein surgery and those who have known risk factors for thromboembolism, receive a prophylactic subcutaneous dose of heparin. In addition, vein-stripping patients are given low molecular weight heparin subcutaneously for 5 days after surgery [12,13].

A single prophylactic dose of antibiotic is used for hernia surgery and implantation of vascular devices. This practice is based on literature reports indicating a real risk of nosocomial infections in ambulatory surgery [14].

A fax is sent on the same day of surgery to the referring physician, containing the operative report and the recommended postoperative care. Patients are contacted by telephone the next day, to ascertain their adequate recovery and to evaluate pain control, the incidence of nausea or vomiting, and the general level of satisfaction. A visit to the hospital clinic is scheduled for the second day after surgery, for dressing changes and additional evaluation.

3. Patients and methods

Data were collected prospectively for 873 general surgical cases done during the first 3 years of activity at the Centre (April 1995 through April 1998). The pa-

Table 2
Preoperative tests

Age	Men	Women
<40 Years	No laboratory, or according to history	Haemoglobin
40–60 Years	Glucose, creatinine, ECG	Haemoglobin, glucose, creatinine, ECG
>60 Years	Haemoglobin, glucose, creatinine, ECG, chest X-ray	Haemoglobin, glucose, creatinine, ECG, chest X-ray

Adapted from [8,9].

Table 3
Types of anaesthesia

General	45
Regional	12
Local	37
Local + sedation	6

Values are in percent.

tients were 524 men (60%) and 349 women (40%). Their mean age was 41 years (range 16–87 years). The following parameters were registered: morbidity, efficacy of analgesia, unplanned hospitalisation, 30-day re-admission, and overall satisfaction.

4. Results

Of the total number of cases in the general surgery service 9% were shifted to the ambulatory centre. Of the patients referred for preoperative evaluation in the outpatient clinic, 10% did not qualify for ambulatory surgery.

The following operations were performed: 219 biopsies, 70% lymph nodes and 30% small tumours; 205 hernia repairs, all inguinal, 90% indirect and 10% direct; 134 excisions of varicose veins, 70% being unilateral stripping of the greater saphena; 128 proctology procedures, including excisions of anal lesions, haemorrhoidectomy, sphincterotomy and fistulectomy; 134 vascular access procedures, 90% Port-a-cath® and 10% other catheters (Groshong® and Permcath®); 16 implants of lumbar capsule, for treatment of chronic pain, as part of a clinical trial protocol [15]; 13 arterio-venous fistulas for haemodialysis (Brescia-Cimino); 24 laparoscopic cholecystectomies, 22 in the 'one-day with night,' and two in the 'same-day' category; and one lysis of adhesions by laparoscopy, for chronic abdominal pain. The types of anaesthesia used are summarised in Table 3.

Of the cases 25% were in the 'ambulatory', 65% in the 'same-day', and 10% in the 'one-day with night' category. Five patients had unplanned admissions (0.6%) for not satisfying the discharge criteria.

The complication rate was 1%. There were four haematomas, three after varicose vein stripping, and one after hernia repair; four scrotal oedemas, all after hernia repair; and one superficial cellulitis of the leg, after vein stripping. There was no mortality. No recurrences of hernias or varicose veins were observed, but the follow-up period was too short for a relevant analysis.

At the time of the first-day postoperative evaluation, 22 patients (2.5%) could not be reached by telephone. All others provided adequate information. Of these 95% were satisfied with the care they received, and 95% reported satisfactory analgesia. Five percent reported postoperative nausea or vomiting. Five patients (0.6%) were not fully satisfied, mainly complaining of delays or changes in the operating room schedule, and the remaining (4%) were uncertain at the time of the evaluation.

5. Discussion

This audit is based on the initial 3 years (1995–1998) activity at the Ambulatory Surgery Centre at Lausanne University Hospital. We assessed 873 general surgery cases, which represent approximately 25% of the cases performed in the Centre during that period. The overall evaluation is encouraging. No significant problems were found. The 'learning curve' phenomenon was not observed. This may have been the result of meticulous planning prior to opening the facilities. In that preparatory period, experienced teams were contacted, other centres were visited, agreements were made with insurance companies, and demographic data was gathered within and outside the institution. In addition, the full-time personnel were chosen based on experience and motivation.

The surgical results compare favourably with those of centres that have longer experience [16]. The overall incidence of complications was low, and there were no serious complications or deaths. The follow-up period was not sufficient to evaluate the long-term results, particularly important in hernia and varicose vein surgery. Bilateral hernias were occasionally repaired on the same day, in selected cases, usually on patients who were young and highly compliant with postoperative care.

Ambulatory requires careful planning and preparation. Deviation from this concept may have been the cause of the dissatisfaction of some patients. In the ambulatory setting, potential complications and postoperative treatment must be more accurately anticipated than for inpatient care, and patients and referring physicians must be clearly informed and actively participate. The operations should be performed, or directly supervised, by fully trained surgeons and anaesthetists using proven anaesthetic and surgical techniques. When such principles are not followed, there is greater risk of delays in the schedule. Consequently, more patients may need to be admitted for overnight observation. The preoperative visit is of paramount importance. Patients tend to feel more secure if examined by experienced physicians, ideally those who will be present in the operating theatre. In addition, this reduces errors in patient selection that may lead to cancellations or unplanned hospitalisations.

Teaching and training aspects [17], which are particularly important in a university hospital, must be care-

fully considered. It is desirable that trainees be exposed to all aspects of outpatient surgery, including patient selection and practice administration. This will prepare them to provide surgical care that is increasingly shifted into outpatient care. However, ambulatory surgery makes sense only if it can maintain or improve the quality of care, which may be difficult to achieve with the usually short rotations of physicians in training and students. It is clear that supervision by fully trained surgeons and anaesthesiologists is mandatory regardless of the level of the trainee or the magnitude of the procedure. It may also be advisable to limit the participation in ambulatory surgery to advanced trainees. This will allow them to practice many procedures that are commonly required in the surgical curriculum.

From the economic point of view, there is evidence that an ambulatory structure leads to savings compared to traditional management [4]. Although this study does not assess the financial aspects, a significant economy has been observed in all services participating in the centre. These data were reported by Wasserfallen et al. [18], who also estimated that 39% of the cost of implementation could be recovered in 1 year of optimal utilisation of the facilities. Nevertheless, in a liberal health care delivery system, it is important that administrators and insurance companies be made aware that surgeons and anaesthesiologists must not be coerced to treat as outpatients those who are better served by inpatient care.

The current study shows an excellent overall patient satisfaction rate. This high acceptability for a practice recently introduced in the community suggests that new procedures may be incorporated in the future. However, only procedures previously tested in the inpatient setting are recommended. Recently developed procedures or technologies should be adopted with caution, to ensure the safety and efficiency of the system and avoid additional training costs. A sensible resistance to pressure from insurance policies, competition, surgical advances, media, industry, and patient preferences is often needed to maintain excellence.

In summary, the present analysis shows that our initial results are comparable to those from other centres that have longer experience [16,19,20]. They confirm that ambulatory surgery is safe, effective and acceptable to patients and their relatives. This is achieved by selection criteria that consider not only the surgical pathology, but also the individual, and by using appropriate techniques and planned postoperative analgesia.

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Current therapy for management of postoperative nausea and vomiting: the 5-HT_3 receptor antagonists

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Abstract

The control of postoperative nausea and vomiting (PONV) remains a problem in spite of the improvements achieved with newer anesthetic agents, such as propofol, and newer antiemetics. Management of PONV is difficult, this is most likely due to the multiple receptors and neurotransmitters in the central nervous system that mediate the emetic response, and to the multifactorial etiology of PONV. Studies of the four major 5-hydroxytryptamine (serotonin) subtype-3 (5-HT_3) receptor antagonists suggest that they have similar safety and efficacy for prevention and treatment of PONV. These drugs lack the significant side effects observed with traditional antiemetics. Combination regimens of 5-HT_3 receptor antagonists and traditional antiemetics can improve antiemetic efficacy. Areas of future study include comparing the cost effectiveness of these agents and determining optimal combinations of antiemetics to further reduce the incidence of PONV.

Keywords: Antiemetic; Postoperative nausea and vomiting; PONV; 5-HT_3 receptor antagonist

1. Introduction

The introduction of propofol, avoidance of routine antagonism of residual neuromuscular block, and the abandonment of required liquid intake before patient discharge has decreased the incidence of postoperative nausea and vomiting (PONV) [1]. Nevertheless, PONV still occurs frequently; the reported incidence is highly variable, ranging from 8–92% [2]. On average, approximately 20–30% of patients experience PONV after surgery [3]. Patients rank freedom from PONV high and are willing to accept some pain and drowsiness in return [1]. Postoperative emesis also can cause detrimental effects, including wound bleeding and dehiscence, esophageal tears, aspiration pneumonitis, dehydration, and electrolyte imbalances (e.g. hypochloremia, hypokalemia, metabolic alkalosis). When these occur after outpatient surgery, emergency admissions to the hospital can result [4]. The 5-hydroxytryptamine (serotonin) subtype-3 (5-HT_3) receptor antagonists represent a major advance in the management of PONV. They are highly effective and lack the sedative and dysphoric effects of traditional antiemetics such as droperidol, the cardiovascular effects of phenothiazines, and the extrapyramidal symptoms associated with high-dose metoclopramide [5–7].

Dolasetron mesilate is the most recent 5-HT_3 receptor antagonist to be approved in the USA. Similar to ondansetron, dolasetron is indicated for the prevention of chemotherapy-induced nausea and vomiting (CINV) and PONV, and for treatment of established PONV. Two other 5-HT_3 receptor antagonists, granisetron and tropisetron, are approved for the prevention of CINV and are under evaluation for use in managing PONV.

Many publications describe the effectiveness of the 5-HT_3 receptor antagonists for management of PONV

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versus placebo, older antiemetics, and other agents in the class. In this report, we attempt to provide a comprehensive overview of current PONV management.

1.1. Etiology and incidence of PONV

The mechanisms underlying PONV are not well understood and it is likely that several factors are involved. Little is certain about the etiology of nausea and its subjective nature makes measurement difficult [2,8]. Mechanical disturbances of 5-HT-containing cells in the intestinal wall may contribute to emesis. In addition, certain anaesthetic drugs and opiate analgesics increase the likelihood of PONV [1,2,9]. Opioids and anaesthetics act directly on the chemoreceptor trigger zone (CTZ), which is rich in neural fibers possessing muscarinic M_1, histaminic H_1, dopaminergic D_2, serotonergic 5-HT_3, and vasopressinergic receptors. All of these receptors mediate message transmission to the vomiting center and blocking these receptors is the mode of action of many antiemetic drugs [9,10]. In some cases, optical or vestibular signals to these receptors may be involved. Motion sickness, thought to be the result of aberrant optical and vestibular symptoms [11], is not well controlled by 5-HT_3 receptor antagonists but responds to vestibular histamine receptor antagonists (e.g. meclizine) or vestibular muscarinic receptor antagonists (e.g. scopolamine) [10].

Much information has been accumulated regarding the various factors affecting the incidence of PONV, including the patient's physical traits, general health, mental state, surgery type and site, premedications, type of anaesthesia used, and postoperative pain treatment [2,10,12,13]. Some variables that correlate positively with incidence of PONV are listed in Table 1. Conversely, some factors are associated with a reduced occurrence of PONV, for example, chronic alcohol use. Because so many variables influence the likelihood of PONV and because efficacy endpoints differ among clinical trials, comparisons of antiemetic agents from published reports are problematic.

Table 1
Variables with positive correlation to PONV

Variable	Most likely to experience PONV
Age	Younger
Gender	Female
Menstruation	Time of cycle
Weight	Obesity
Pre-existing disease	Diabetes, renal disease
Surgery duration	Longer than 3 h
Premedication	Opiates
Balanced anaesthesia	Opiate analgesic use, etomidate
Previous history	Motion sickness, PONV, allergies
Type of surgery	Gynecologic; ear, nose and throat; laparoscopy; intra-abdominal; breast operations (females); testicular operations (males); strabismus operations (children)
Postoperation/ recovery room	Pain, movement, hypotension

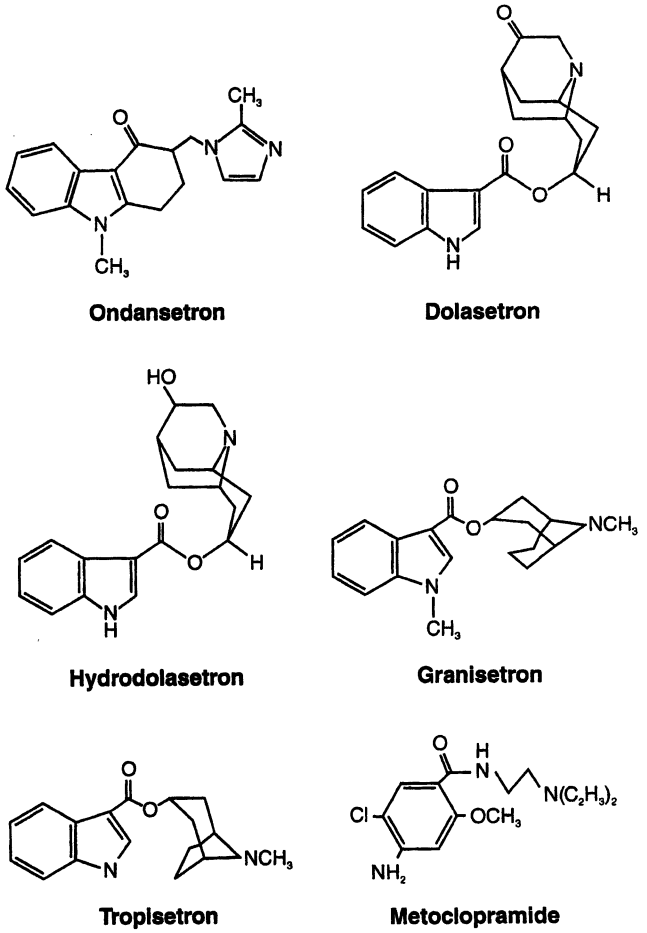

Fig. 1. Chemical structures of the 5-HT_3 receptor antagonists.

2. 5-HT_3 receptor antagonists

2.1. Pharmacology

Ondansetron, dolasetron, granisetron, and tropisetron are all highly selective at the 5-HT_3 receptor with receptor specificity and binding greater than 100:1 (Fig. 1) [5,14–17]. These agents do not affect histaminic, dopaminergic, or cholinergic receptors, hence, their lack of side effects such as drowsiness, dry mouth, tardive dyskinesia, and extrapyramidal effects [5]. Table 2 shows several pharmacokinetic parameters of the four 5-HT_3 receptor antagonists. Ondansetron is a carbazole; derived from a modification of the serotonin molecule [15]. Systemic clearance of ondansetron is slower in females, the elderly, pediatric patients, and cancer pa-

Table 2
Pharmacokinetics of 5-HT_3 receptor antagonists in healthy volunteers

5-HT_3 Receptor antagonist	$t_{1/2}$ (h)	$AUC_{(0\rightarrow\infty)}$	CL	V_d
Ondansetron [5,13,63]				
Oral (4–8 mg)	3.2	133 h ng/ml	541 ml/min	1.8 l/kg
IV (8 mg)	3.5	229 h ng/ml	578 ml/min	
Dolasetron [19–22]				
Oral (50 mg)	5–10	469 μg/l h	—	5.5 l/kg
IV (12.5 mg)	4–8	—	0.61–0.94 l/h/kg	
Granisetron [5,16]				
IV (40 μg/kg)	10–12	350 h ng/ml	33.4–75.7 l/h	174–258 l
Tropisetron [14]				
IV (5 mg)	7.3[a] 30.3[b]	239[a] 1192[b] μg/l h	0.96[a] 0.20[b] l/min	554[a] 463[b] l[b]

IV, intravenous; h, hour; min, minute; l, liter; ml, milliliter; kg, kilogram; mg, milligram; ng, nanogram; μg, microgram.
a Extensive metabolizers.
[b] Poor metabolizers.

tients; however, dosage adjustments are usually not necessary for these patients [1,15]. A small study in healthy volunteers showed intramuscular (IM) injection of ondansetron to have the same systemic availability as intravenous (IV) dosing [18]. Dolasetron mesylate is a pseudopelletierine-derivative [17,19]. Dolasetron has a serum half-life of 9 min and is rapidly reduced by ubiquitous plasma reductase to its major metabolite, hydrodolasetron, which is responsible for the drug's antiemetic effect [20,21]. Pharmacokinetics of hydrodolasetron in elderly patients are similar to those in younger patients [22]. Greater mean apparent clearances and shorter terminal half-lives of hydrodolasetron were detected in children [23] and longer elimination times were seen in patients with renal dysfunction [24]; however, dosage need not be adjusted for either population group. Granisetron, a derivative of metoclopramide [5], has an elimination half-life of approximately 4 h in healthy volunteers and 10–12 h in cancer patients [16]. It has not been determined whether these divergent findings are due to differences in drug elimination due to the underlying disease process, drug interactions with antineoplastic agents, changes in plasma protein binding, or the relative older age of cancer patients compared with healthy volunteers [16]. Like ondansetron, tropisetron was originally derived from the serotonin molecule [5]. Because it is metabolized by the hepatic cytochrome P450 2D6 enzyme system, polymorphism may cause some patients to metabolize tropisetron faster than others [14].

2.2. Clinical trials

2.2.1. Patients

Because of their propensity of developing PONV [1,2], female patients undergoing gynecologic surgery with general, balanced anaesthesia have been predominately studied in clinical trials of antiemetics. Females are two to three times as likely to experience emesis as males, perhaps due to variations in serum gonadotropin (or other hormonal) levels [1]. Moreover, gynecologic surgeries-whether due to proximity to abdominal vagus nerves, insufflation of CO_2 into the abdominal cavity during laparoscopy, or type of anaesthesia (usually general balanced)-are associated with a high incidence of emesis [1]. Relatively few male patients have been studied in PONV trials of the 5-HT_3 receptor antagonists. A notable exception is a recently reported trial of ondansetron in male outpatients ($n = 468$) [25]. This trial indicated prognostic factors thought to be associated with increased PONV in males: (1) history of motion sickness; (2) previous PONV; (3) longer surgery duration (> 3 h); and (4) non-orthopedic surgery.

2.2.2. Study design/efficacy measures

Efficacy measures used in PONV trials vary among agents, and rarely, among clinical trials of the same agent [26–28]. Almost all 5-HT_3 receptor antagonist clinical trials have used a 24-h period after administration of study drug. In outpatient surgery, the patient is often evaluated across two intervals: an acute, 2-3 h period after receipt of antiemetic prevention or treatment in the postanesthesia care unit (PACU), and the remaining 21- or 22-h interval when PONV is recorded by the patient at home. In most 5-HT_3 antagonist clinical trials, retching (unproductive emesis) and vomiting are each considered primary efficacy endpoints, and nausea presence and severity are evaluated as secondary efficacy endpoints. In some trials, endpoints such as patient satisfaction are also measured.

Table 3
5-HT_3 receptor antagonist dosing

Drug	IV and oral	IV dose: prevention	IV dose: treatment	Oral dose: prevention
Ondansetron	Yes/yes	4 mg Prior to induction[a]	4 mg	16 mg (1–2 h before anesthesia)
Dolasetron	Yes/yes	12.5 mg Prior to emergence	12.5 mg	100 mg (1–2 h before anesthesia)
Granisetron[b]	Yes/?	40 μg/kg After emergence	0.1 mg[c]	N/A
Tropisetron[b]	Yes/?	5 mg Before induction or at emergence	N/A	N/A

N/A, Not applicable.
[a] Results of recent studies suggest administration prior to emergence may provide better effect [47,48].
[b] Oral dosage form available for prevention of chemotherapy-induced nausea and vomiting.
[c] Only one IV granisetron treatment study [57].

2.2.3. Ondansetron

In ondansetron trials, efficacy was defined by the number of emetic episodes (retching was included in the definition of emesis in some studies but not all) [26]. Complete response was defined as no emetic episodes and no receipt of rescue antiemetic medication. In most studies, nausea was patient-assessed as present or absent. When present, nausea severity was rated by patients on an 11-point linear scale (0 = 'no nausea' and 10 = 'nausea as bad as it can be'), at frequent intervals throughout the evaluation period [12,15,18,25,26,29–32].

2.2.4. Dolasetron

Efficacy measures were standardized across all dolasetron PONV clinical trials [33–40]. Complete response was the primary efficacy measure, defined as no emetic episodes (vomiting or retching) and no rescue medication. Patient-assessed nausea severity, evaluated via a 100-mm visual analog scale (VAS) (0 = no nausea and 100 = severe nausea) frequently during the acute period, at discharge, and at 24 h. Patient satisfaction was also recorded using the 100-mm VAS at 24 h. Total response (complete response with no nausea, < 5 mm VAS) was also measured.

2.2.5. Granisetron

In two PONV prevention trials, efficacy was measured by anaesthetist interview across two time intervals: 0–3 and 3–24 h following recovery. A single score indicated only the presence or absence of nausea or vomiting: 0 = no emetic symptoms, 1 = nausea, and 2 = vomiting [27,41]. In another PONV prevention trial, granisetron efficacy was defined by the number of emetic episodes (vomiting and/or retching) and patient self-assessed nausea on a 100-mm VAS across one 24-h interval [28].

2.2.6. Tropisetron

Efficacy of tropisetron in two trials was measured by the number of emetic episodes (vomiting and/or retching) and severity of nausea as rated by the investigator (absent to severe, on a 0–3 rating scale) [8,42]. Complete response was defined as no vomiting, retching, or nausea during the 24-h study period. In another trial, nausea and vomiting were rated by nurse observation, by anaesthetist interview, and by patient self-report on a 100-mm VAS. Patient satisfaction with antiemetic treatment was also assessed in this trial [43].

2.3. Dosing

Seemingly, the doses of the 5-HT_3 receptor antagonists studied in dose-response trials for PONV management have all been on the plateau of the response curve. Dose-ranging studies of ondansetron have shown IV and oral doses of 4 and 8 mg, and 8 and 16 mg, respectively, to be equally effective [29,44]. The lowest IV dolasetron dose tested, 12.5 mg, was as effective as the 100 mg IV dose when administered prior to emergence from anaesthesia [33–35]. Data have also shown a flat dose–response relationship across the 20, 40, and 160 μg IV doses of granisetron [27,41]. Finally, tropisetron PONV trials have used a 5 mg IV dose, based on the finding in CINV studies that a 5 and 10 mg dose were equally effective [45]. More recently, however, a 2-mg dose of tropisetron has been shown to have similar efficacy to a 4-mg dose of ondansetron in female patients (Table 3) [46].

The difficulty in determining an optimal antiemetic dose for prevention of PONV is further confounded by the timing of study drug administration. Early trials dosed the IV 5-HT_3 receptor antagonists before the emetic stimuli of anaesthesia and surgery. More recent studies have reported equivalent rates of PONV prevention with substantially lower doses when the antiemetic is administered just prior to emergence from anaesthesia. Dolasetron 12.5 mg IV administered prior to emergence from anaesthesia appears as effective as 50 mg dolasetron IV administered prior to induction of anaesthesia [33–36]. Recent studies indicate similar findings with ondansetron when administered at the end of anaesthesia [47,48].

3. Efficacy

3.1. IV PONV prevention

3.1.1. Ondansetron

A number of dose-finding studies have shown 4 mg IV ondansetron to be optimal for prevention of PONV, although an 8 mg dose may be more effective in women, undergoing laparoscopy, with a history of PONV, as well as patients who weigh more than 80 kg [13,31]. In placebo-controlled clinical trials, complete response rates achieved with 4 mg IV ondansetron were 16–30% better than those seen with placebo in adult patients [13,15,18,29–32]. In comparative trials, 4 mg IV ondansetron was statistically superior to 10 mg IV metoclopramide [49,50] but not different from 1.25 mg IV droperidol [51] in controlling emesis. Ondansetron was significantly less effective than 2.5 mg droperidol in another trial [52]. Table 4 lists several trials in which a 5-HT_3 receptor antagonist was compared with traditional antiemetics.

Timing of ondansetron administration was evaluated in two recent clinical trials. In patients undergoing otolaryngologic surgery, 4 mg IV ondansetron was not more effective than placebo in preventing emesis, which was likely due to stimulation of the vestibular labyrinthine system [12]. Nevertheless, patients, who received 4 mg IV ondansetron at emergence of anaesthesia, received rescue medication less often than those who received ondansetron before induction of anaesthesia [47]. A trial in women undergoing laparoscopic surgery reported similar results when ondansetron was administered near the end of anaesthesia [48].

3.1.2. Dolasetron

An 8-fold range of IV dolasetron doses was tested (12.5–100 mg IV) in four placebo-controlled randomised PONV prevention studies [33–36] (Table 5). The majority of patients in these studies (78%) were females undergoing gynecological surgeries under general anaesthesia. Combined data from these studies indicated an 18 to 22% increase in complete response rates with dolasetron compared with placebo in this patient population [53]. In three of the four studies, dolasetron was administered just prior to emergence from anaesthesia; the lowest dose, 12.5 mg, was as effective as higher doses (25–100 mg) [33–35]. The fourth trial was a comparative study in which IV dolasetron (25 or 50 mg), IV ondansetron (4 mg), or placebo was administered before induction of anaesthesia [36]. In this study, the 50 mg dolasetron dose was as effective as the approved ondansetron dose, and both drugs were significantly superior to placebo. No clinical trials comparing dolasetron with metoclopramide or droperidol for management of PONV have been reported. Further research is need to determine dolasetron's efficacy in relation to metoclopramide and to droperidol.

3.1.3. Granisetron

A dose-finding trial of granisetron in patients undergoing major gynecologic surgery under general anaesthesia showed 40 and 60 μg/kg IV doses to be equally effective and both were superior to placebo and a 20 μg/kg granisetron dose [41]. This trial suggested 40 μg/kg granisetron was the optimal dose in this patient group. In another trial, fixed-dose granisetron 3 mg IV was compared with metoclopramide 10 mg IV and placebo in females undergoing general anaesthesia for major gynecological surgery [27]. Granisetron was administered immediately after recovery from anaesthesia. Granisetron and metoclopramide were not statistically different for preventing acute (0–3 h) emesis (both were superior to placebo). However, granisetron was statistically superior to both metoclopramide and placebo during the 3–24 h interval. A comparison trial of granisetron and droperidol showed both antiemetics were superior to placebo, but there was no statistical difference between efficacy rates of 40 μg/kg granisetron and 1.25 or 2.5 mg droperidol at 0–3 h [54]. During the 3–24 h interval, 40 μg/kg granisetron and 2.5 mg droperidol had similar efficacy rates and both were statistically superior to the lower dose of droperidol and placebo.

3.1.4. Tropisetron

Three trials of 5 mg IV tropisetron showed statistical significance versus placebo for preventing PONV. In one trial, tropisetron was administered before induction of anaesthesia to women who were undergoing gynecologic surgery with 65% of tropisetron patients vs 40% of placebo patients experiencing a complete response (no nausea, emesis, or rescue medication) [42]. In a second trial, tropisetron was administered 15 min before emergence from anaesthesia to a similar patient population with 74% of tropisetron-treated patients vs 41% of placebo-treated patients not experiencing emesis [8]. However, 69% of patients in the tropisetron group and 88% of placebo-treated patients experienced nausea. In a third trial, tropisetron was compared with droperidol, metoclopramide, and placebo in a 36-h trial for prevention of PONV associated with patient-controlled analgesia with morphine after orthopedic surgery [43]. Tropisetron reduced the incidence and severity of emesis for 18 h compared with 36 h for droperidol. Metoclopramide had only a marginally significant effect on emesis. Only droperidol significantly reduced the need for rescue medication in this trial; however, compared with tropisetron, droperidol use was more often associated with sleepiness and anxiety.

Table 4
5-HT_3-receptor antagonists vs other antiemetics for PONV prophylaxis

Reference	Drug doses	Results	
		Percentage with emesis	
Alon and Himmelseher [69] 66 women	IV OND 8 mg	13[b]	
	METO 10 mg	54	
	DROP 1.25 mg	45	
		Percentage no severe emetic sequelae	
Desilva et al. [70] 360 female inpatients	IV OND 4 mg	63[a]	
	DROP 1.25 mg	76[a]	
	Perphenazine 5 mg	70[a]	
	METO 10 mg	50	
	Placebo	43	
		Percentage no emesis in PACU	Percentage naseau in PACU
Sun et al. [71] 125 adult outpatients (58 women 67 men)	IV OND 4 mg	8[a]	60
	METO 20 mg	35	52
	DROP 1.25 mg	25	56
	METO 20 mg + DROP 0.625 mg	20	76
	Placebo	20	72
		Percentage no PONV	
Grond et al. [52] 80 adult female inpatients	IV OND 8 mg	68[c]	
	DROP 2.5 mg	88	
		Percentage emesis	Percentage nausea
Gan et al. [51] 120 patients undergoing orthopedic surgery	IV OND 4 mg	17[a]	23
	DROP 1.25 mg	18[a]	29
	Placebo	45	21
		Percentage emesis and nausea	
		0–3 h postop	3–24 h postop
Fujii et al. [54] 100 adult female inpatients	IV GRAN 40 pg/kg	12[a]	8[a]
	DROP 1.25 mg	16[a]	36[a]
	DROP 2.5 mg	12[a]	12[a]
	Placebo	60	44
		Mean PONV score (0–2)	
		0–3 h	3–24 h
Fujii et al. [27] 60 adult female inpatients	IV GRAN 3 mg	0.1[a]	0.1[a]
	METO 10 mg	0.1[a]	0.5
	Placebo	0.8	0.6

PONV, postoperative nausea and vomiting; OND, ondansetron; GRAN, granisetron; TROP, tropisetron; METO, metoclopramide; DROP, droperidol; PACU, postanesthesia care unit
[a] Statistical significance ($P<0.05$) compared with placebo.
[b] Statistical significance ($P<0.05$), OND compared with DROP.
[c] Statistical significance ($P<0.05$), DROP compared with OND.
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Table 5
Dolasetron PONV trials: complete response rates (%)

Clinical trial	Dolasetron dose (% mg)					
	Placebo	12.5	25	50	100	200
IV prevention (overall, $n = 2332$)	36	54	54	54	58	
Graczyk et al. [33]	31	50	52	56	—	
Diemunsch et al. [34]	43	54	67	59	59	
Kovac et al. [35]	49	60	55	58	58	
Korttila et al. [36]	59	—	51	71	—	
P value*		$P < 0.0001$	$P < 0.0001$	$P < 0.0001$	$P < 0.0001$	
Oral preventation (overall, $n = 1167$)	33	42	52	52	48	
Diemunsch et al. [39]	35	—	45	57	51	47
Warriner et al. [40]	29	—	36	41	54	49
P value*		$P = 0.056$	$P < 0.0001$	$P = 0.0001$	$P = 0.0014$	
IV treatment (overall, $n = 957$)	11	32	28	32	28	
Diemunsch et al. [37]	11	24	28	37	25	
Kovac et al. [38]	11	35	28	29	29	
P value*		$P < 0.0001$	$P = 0.0027$	$P < 0.0001$	$P = 0.0001$	

* Overall P value compared with placebo.

3.2. 5-HT_3 comparison trials

Several head-to-head trials of IV 5-HT_3 receptor antagonists have been conducted (Table 6). Korttila et al. reported results of a trial showing comparable efficacy between IV dolasetron 50 mg and ondansetron 4 mg when administered prior to the induction of anaesthesia (both drugs were statistically superior to placebo) [36]. In a similar study, Scholz et al. reported that IV ondansetron 4 mg and IV tropisetron 2 mg produced similar reductions in PONV incidence compared with placebo [46]. Among female patients, administration of tropisetron or ondansetron was associated with similar decreases in emesis compared with placebo. However, in male patients, neither drug appeared to be effective, regardless of the type of surgery. Finally, a study comparing ondansetron, granisetron, tropisetron, metoclopramide, and placebo was reported by Naguib and colleagues [50]. The three 5-HT_3 receptor antagonists had similar effectiveness and all were superior to placebo ($P < 0.05$). Only ondansetron was also more effective than metoclopramide ($P = 0.02$).

3.3. IV treatment of established PONV

3.3.1. Ondansetron

In treatment studies, patients were eligible to receive ondansetron or placebo if they: (1) experienced nausea and/or vomiting; (2) requested PONV medication; or (3) were judged by study or PACU personnel to need treatment within 2 h of entry into the PACU. A recently published systematic review [55] of seven ondansetron treatment trials (four placebo-controlled and three comparison studies) reported that treatment with ondansetron was more effective than placebo in approximately 25% of patients for ameliorating established PONV. There was no clinically relevant dose response between 1, 4, and 8 mg doses. Two of the comparison studies with droperidol indicated no statistical difference in complete response rates between ondansetron and droperidol (8 mg IV ondansetron three times a day vs 1.25 mg IV droperidol, $n = 100$; and 100 μg/kg ondansetron vs 20 μg/kg droperidol, $n = 29$) [55]. However, a large comparative trial with metoclopramide ($n = 746$) showed ondansetron (4 mg) was superior to metoclopramide (10 mg) for treatment of established emesis [56].

3.3.2. Dolasetron

The eligibility criteria in dolasetron treatment trials were similar to those in ondansetron trials. Combined results of two placebo-controlled, randomised clinical trials showed 12.5 mg IV dolasetron to be superior to placebo for complete response (32 vs 11%, respectively, $P < 0.0001$) [53]. The 12.5 mg IV dose was as effective as the three higher doses (25, 50, and 100 mg) studied in these trials.

3.3.3. Granisetron

At the time of this report, there is one reported abstract of the use of IV granisetron for the treatment of PONV [57]. Patients received 0.1, 1.0 or 3.0 mg IV granisetron or placebo if they experienced nausea or emesis within 6 h after surgery. Complete response rates of 38, 46, and 49% in the granisetron 0.1, 1.0 and 3.0 mg groups, respectively, were statistically significant compared to the placebo (20%) group.

Table 6
Comparison trials of 5-HT_3-receptor antagonists

Reference	Drug doses	Results	
Korttila et al. [36]		Percentage no emesis	Percentage no emesis, no nausea
514 Adults	IV DOL 25 mg	51	43
(484 women,	IV DOL 50 mg	71*	60*
30 men)	OND 4 mg	64*	54*
	Placebo	49	36
Naguib et al. [50]		Percentage no emesis	
132 adults	IV OND 4 mg	65.5**	
(108 women,	GRAN 3 mg	52	
24 men)	TROP 5 mg	48	
	METO 10 mg	29.2	
	Placebo	27.6	
Scholz et al. [46]	Abdominal surgery ($n = 504$), percentage emesis		
842 adults	All	Women	Men
IV OND 4 g	29*	31*	19
TROP 2 mg	30*	36*	8
Placebo	42	42	15
	Nonabdominal surgery ($n = 338$), percentage emesis		
	All	Women	Men
IV OND 4 g	21	24	14
TROP 2 mg	27	22	18
Placebo	23	25	20

PONV, postoperative nausea and vomiting; OND, ondansetron; GRAN, granisetron; TROP, tropisetron; METO, metoclopramide; DROP, droperidol; PACU, postanesthesia care unit.
* Statistical significance ($P < 0.05$) compared with placebo.
** Statistical significance compared with METO ($P < 0.05$).
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Information regarding IV tropisetron for treatment of established PONV is not available at this time.

3.4. Oral prevention

3.4.1. Ondansetron

Early clinical trials showed multiple oral doses of ondansetron (8 mg three times daily and 16 mg twice daily), administered before anaesthesia and after recovery, were effective for PONV prevention [44,58]. Subsequent trials in female inpatients confirmed the effectiveness of a single 16 mg oral dose before surgery [32]. A comparative trial in women undergoing gynecological laparoscopy showed a 4 mg oral ondansetron dose to be more effective than 10 mg oral metoclopramide [59]. In this study, 26% of patients who received 4 mg oral ondansetron experienced PONV compared with 42% of patients who received 10 mg metoclopramide and 50% of placebo-treated patients.

3.4.2. Dolasetron

Pooled data from two large, placebo-controlled, dose-finding studies in females undergoing gynecologic surgery ($n = 1167$) showed oral doses of 50 mg dolasetron administered 1–2 h prior to anaesthesia to be superior to placebo for complete response (52 vs 33%, respectively, $P < 0.0001$) [53]. Higher doses did not confer greater efficacy.

Information regarding oral granisetron or tropisetron for prevention of PONV is not available at this time.

3.5. Combination studies

Research has shown increased efficacy can be achieved when a 5-HT_3 receptor antagonist is used in combination with an antiemetic agent from a different class, for example, dexamethasone. Two studies conducted by McKenzie et al. showed that the addition of 8 or 20 mg dexamethasone to 4 mg IV ondansetron

Table 7
Studies of combination regimens with an IV 5-HT_3-receptor antagonist

Reference	Drug dose	Results		
McKenzie et al. [59]		Percentage complete response		
180 adult female inpatients	OND 4 mg	38		
	OND 4 mg + DEX 8 mg	52*		
McKenzie et al. [60]		Percentage complete response		
80 adult female inpatients	PROP + OND 4 mg + DEX 20 mg	53*		
	PROP + OND 4 mg + placebo	38		
Fujii et al. [61]		Percentage no vomiting		
88 women	GRAN 20 pg/kg + DEX 8 mg	95*		
	GRAN 20 pg/kg	77		
	DEX 8 mg	77		
	Placebo	77		
Belo and Koutsoukos [62]		Percentage nausea/emesis		
		0–6 h	6–12 h	12–24 h
80 adult female inpatients	OND 4 mg	7*	21	18
	DROP 1.25 mg	7*	40	18
	OND 4 mg + DROP 1.25 mg	7*	40	18
	Placebo	34	43	34

OND, ondansetron; DEX, dexamethasone; GRAN, granisetron; DROP, droperidol; PROP, propofol
* Statistical significance ($P < 0.05$) compared with placebo.
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improved antiemetic efficacy, as measured by complete response rate (Table 7) [60,61]. Similarly, Fujii et al. determined that the addition of 8 mg IV dexamethasone improved the effectiveness of 20 mg/kg IV granisetron when compared with granisetron alone, dexamethasone alone, or placebo [62]. Belo and Koutsoukos reported that the administration of 4 mg IV ondansetron with 1.25 mg IV droperidol significantly decreased incidence of PONV for the first 6 h after surgery compared with placebo, but the combination provided no benefit compared with either antiemetic used alone [63].

3.6. Safety

The 5-HT_3 antagonists are generally well tolerated with few adverse effects. Because they have little or no affinity for α_1, α_2, and β_1-adrenergic receptors; 5-HT_{1A}, 5-HT_{1B}, 5-HT_2, D_2, and D_3 dopaminergic receptors; benzodiazepine receptors; cholinergic receptors; or histamine (H_1) receptors, the 5-HT_3 antagonists do not interfere with surgical anaesthesia [1,5]. For the same reasons, they are not associated with extrapyramidal effects, sedation, or anticholinergic effects [5,10].

Headache is the most commonly reported adverse event in clinical trials of the 5-HT_3 receptor antagonists. Other known side effects of these agents include light-headedness, flushing, and constipation [64]. All members of this drug class are known to cause asymptomatic and transient treatment-related ECG changes [65–68]. No cardiovascular sequelae have been attributed to these changes.

4. Discussion

Comparing the efficacy of drugs to prevent or treat PONV is difficult due to the variety of efficacy parameters, surgical procedures, and anaesthetic techniques employed in various clinical trials. Moreover, there are myriad of patient variables that influence PONV within a study, not to mention between studies. Nevertheless, many clinical trials have tried to minimize confounding patient-related factors by examining the same type of patients: females undergoing gynecologic surgery. The high frequency of PONV in these patients also lends statistical power to study group comparisons.

Given that exact comparisons are not possible, when 5-HT_3 receptor antagonists are compared with traditional antiemetics the 5-HT_3 receptor antagonists are shown to be as effective as, and in many cases, more effective than, antiemetics commonly used in clinical practice such as droperidol (lower doses), metoclopramide, and perphenazine [49,50,69–71]. They also

have fewer side effects than the older agents. Comparisons among drugs within the 5-HT_3 receptor antagonist class suggest that all four have similar safety and efficacy. A benefit of comparison studies will be determining equipotent doses of the different 5-HT_3 receptor antagonists so that the relative cost-effectiveness of each drug may be determined.

Demonstrating cost effectiveness is important because the 5-HT_3 receptor antagonists are considerably more expensive than traditional antiemetics. However, their relative lack of side effects and quick administration when needed for treating established PONV can result in improved health outcomes for patients. Two recent reports indicate that, compared with placebo, use of IV dolasetron resulted in decreased resource utilization when administered as prophylaxis [72] or as treatment for established PONV [73]. Routine PONV prevention may not be an option at many surgical sites; however, providing prophylaxis for the highest risk patients (e.g. females undergoing laparoscopic surgery or patients with a previous history of PONV) may prove cost effective. Further study is needed to gauge actual cost savings in caregiver time and resources expended to prevent and/or treat PONV.

Another area that merits continued research is the utility of combination therapy for management of PONV [74]. Combination therapies were avoided with early antiemetics due to concern about additive central nervous system toxicity [10]. However, because numerous neurotransmitters (dopaminergic, histaminic (H_1), cholinergic muscarinic, and serotonergic) appear to play roles in the emetic response, and many different receptors send input to the vomiting center, no single drug has been able to completely block the emetic pathway and act as a universally effective antiemetic agent [10,11]. This may explain the demonstrated improvements in efficacy with combination therapy [60–62].

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Quality of postoperative analgesia in day-case operative knee arthroscopy: role of fentanyl added to intra-articular bupivacaine and antiinflammatory therapy

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Abstract

Adding opioids to intraarticular local anaesthetics is a common practice for postarthroscopy pain relief, but the results are controversial. We compared 60 patients randomized in two groups who following knee arthoscopy received intraarticular bupivacaine ($n = 29$), or fentanyl + bupivacaine ($n = 31$) for postoperative pain relief. All patients were on ibuprophen therapy, and care was taken to maintain local cold over the operated knee. The incidence of pain in the post anasthesia care unit (PACU) and postoperative pain was very low (13–17%) and not related to the administration of fentanyl, or whether the surgical procedure performed was a meniscectomy or chondroplasty. Postoperative pain was treated in the PACU with i.v. ketorolac, and at home with oral ibuprophen.

Keywords: Day case; Knee arthroscopy; Postarthroscopy pain relief

1. Introduction

Operative knee arthroscopy is currently done on a day-case basis with different types of anaesthesia. As a thigh tourniquet is not frequently used in our unit, the procedure can be safely done under infiltrative local anaesthesia of the knee cavity and through the ports used to introduce the instruments. As the anaesthetic is washed out during the operative procedure, an additional volume of a local anaesthetic solution, usualy 10 ml bupivacaine 0.5% with or without epinephrine, is left inside the knee cavity for postoperative analgesia. Morphine sulfate has been added to the local anaesthetic solution in order to improve analgesia but results of this practice have produced conflicting reports on its real utility [1–3]. Although morphine is a poor lipid soluble opioid it can be absorbed from any anatomical tissue, so results can be attributed either to its local or systemic effects [4].

In other forms of regional anaesthesia fentanyl has been reported to be sinergistic to the analgesic activity of bupivacaine, although through a different mechanism whereby opioid receptors play an important role, but no opioid receptors have been demonstrated to exist in the synovial membrane with standard histological methods. Recent developments in the immunohistochemical techniques have shown reactivity for neuropeptides [5]. The purpose of this study was to compare the postoperative analgesic effects of adding a more lipid soluble opioid, as fentanyl, to the local anaesthetic solution left inside the knee, versus plain bupivacaine 0.5%, in patients receiving antinflammatory oral therapy. Additionally, a potential difference in the incidence of pain was sought according to the type of surgical procedure performed, as chondroplasty is more invasive to the bone integrity than meniscectomy.

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Table 1
Patient data (mean ± S.D.)[a]

	Age	Weight (kg)	Chondroplasty (*n*)	Meniscectomy (*n*)
No Fent. ($n = 29$)	49.62 (± 15.2)	74.9 (± 12.3)	12	17
Fentanyl Intraartic. ($n = 31$)	49.94 (± 15.8)	77.6 (± 9.67)	17	14

[a] Differences not statistically significant.

2. Method

Sixty consenting adult patients, American Society of Anesthesiologists (ASA) classification I–II, undergoing operative knee arthroscopy for meniscectomy, chondroplasty and/or debridement were included in the study. Exclusion criteria were: extremely reduced intraarticular compliance, surgery for anterior cruciate ligament reconstruction, need to use a thigh tourniquet, body weight above 99 kg, age older than 80 years, diabetes, liver or kidney disfunction, allergy to the drugs used, psychiatric treatment, and the need for general anaesthesia or heavy sedation. All patients were operated on a day-care basis, and discharged from the hospital no later than 5 h after the end of the surgical procedure.

Patients were not premedicated, and upon arrival to the surgical area were prepared for a local infiltration of the knee cavity which was done by the anaesthesiologist, with 20 ml 0.25% bupivacaine with epinephrine plus 20 ml 1% lidocaine. The final epinephrine concentration in the solution was 1:400 000. Total volume was administered with an injection through an internal approach, 1–1.5 cm medial and superior to the angle of the knee bone. The surgeon infiltrated the skin over the points used to introduce his instruments inmediately before starting his procedure. Standard monitoring included ekg, automatic blood pressure recording, heart rate, and pulse oximetry. Intraoperative sedation was provided only if needed, with 1 mg midazolam i.v., titrating its effect as to avoid inducing hypnosis.

At the end of surgery patients were randomly asigned to receive either 10 ml bupivacaine 0.5% alone or combined with 2 μg/kg of fentanyl inside the knee cavity. They were moved to the post anaesthesia care unit, with a cryo-cuff, for observation for 1 h, and later transferred to the ward for no more than 5 h stay at the hospital. If patients complained of pain, either in the recovery room or the ward, they received i.v. ketorolac 30–60 mg. Before discharge from the hospital the patients were instructed to take oral ibuprophen 200 mg three times a day, and keep local intermitent cold over the operated knee for the following 72 h. If they should feel pain or severe discomfort at home, the indication was oral ketorolac 20 mg no more frequently than once every 6 h, and note the time for the first analgesic intake.

Results were analyzed with ANOVA and 2-way contingency table with Fisher's Exact Test, $P < 0.05$ being considered significant.

3. Results

As a result of randomization 29 patients received 10 ml intraarticular 0.5% bupivacaine (control group) and 31 received 8 ml 0.5% bupivacaine plus 100 μg fentanyl (fentanyl group). All patients were ASA status I or II. There was no difference between both groups in age or weight (Table 1). A total of 12 patients in the control group, and 17 patients in the fentanyl group underwent chondroplasty, a difference that was also non significant ($P = 0.217$).

Five patients complained of intraoperative pain, four of these in the chondroplasty group. The difference could not be attributed to the surgical procedure as in three of the complaining patients the etiology of pain was identified as due to overpressure in the irrigating system, and corrected simply by lowering the perfusion pressure. Besides, independently of the cause, Fisher's Exact Test yielded a P value $= 0.157$.

Tests for homogeneity showed no difference between the two groups regarding presence or absence of pain in the recovery room, as well as in the following 24 h. Treatment with i.v. ketorolac was successful in every case. The three patients that complained of pain in the recovery room had undergone chondroplasty ($P = 0.107$ vs. no chondroplasty), two out of 29 patients in the control group, and 1 out of 31 patients in the fentanyl group ($P = 0.475$).

Only nine patients needed analgesics in the first 24 h of the postoperative period (control group: 5; fentanyl group: 4, $P = 0.456$). The time taken for the first recorded need for analgesics had a wide variation among the cases, with a range between 2 and 24 h in the control group and 6 and 23 h in the fentanyl group. Mean time for analgesic requirement was also similar in both groups: 15.40 ± 16.88 s.d. (control) versus 14.25 ± 8.06 s.d. (fentanyl group), but patients with chondroplasty ($n = 5$) took the first dose in a mean time of 9.2 ± 4.44 h while those without chondroplasty had a mean time of 22 ± 17.26 h. The difference was not significant ($t_{3.3} = 1.45$, $P = 0.244$) due to the wide dis-

persion in the latter group. Additionaly, postoperative need for supplemental analgesics could not be related to either the occurrence of intraoperative pain or pain in the PACU.

4. Discussion

One of the advantages of the anaesthetic technique used, over epidural or general anesthesia, is that intraoperative pain due to overpressure in the irrigating system is not masked. That type of pain appears in a very short time when pressure inside the knee cavity increases more rapidly than fluid can escape from the system drainage, so it pushes cephalad into the sinovium cavity behind the anterior muscles of the thigh. In theory the fluid does not traverse soft tissues surrounding the knee cavity but simply pushes them out like a hernia, because the exquisite pain which is verbalized as 'deep behind the quadriceps', dissappears in no more than a few minutes after lowering the pressure level in the system. Debruyne et al. reported that pressures higher than 100 mmHg should not be used, to prevent the escape of the solution into the soft tissue of the leg [4].

Pain in the recovery room, although present only in the patients that had undergone chondroplasty, could not be related to this procedure or the administration of fentanyl in the knee cavity. Its incidence was extremely low, as was postoperative need for supplemental analgesics in the following 24 h period.

Ruwe et al. concluded that the most significant predictor of postoperative pain was preoperative level of discomfort [1]. Meniscectomies are usually performed once the acute phase of the original problem has subsided. In our practice most of the patients undergoing arthroscopy who had preoperative discomfort required chondroplasty due to several degrees of arthrosis with reductions in intraarticular compliance. We were unable to find a significant correlation as Ruwe did.

Intraarticular bupivacaine is a common practice for postarthroscopy pain and the addition of morphine has been controversial [1–3,6–8]. Some reports conclude that morphine given without the local anaesthetic is similar to placebo [9] and that bupivacaine is the only drug with a certain effect in the mixture. Other authors communicate exactly the opposite claiming that bupivacaine is much less effective than morphine [10], and some even neglect the effectiveness of both drugs [11].

According to our results the higher lipid solubility and potency of fentanyl do not appear to offer any advantage to the pain relief offered by intraarticular bupivacaine in patients treated with oral ibuprophen and the local physical effect of cold. Some pharmacological effects of morphine have been reported in joints, supporting the hypothesis that it acts as a potential suppressor of the substance P mediated cytokine cascade and the periphereal leukocyte activity [12] after knee surgery.

Although no opioid receptors have been found in normal knee tissues, it has been long known that they can play a functional role in antinociception in inflamed tissue [13]. In animal experiments, Nagasaka et al. were able to describe a peripheral activity of opioids, blocking autonomic responses to pain evoked by compression of the artificially inflamed knee joint of the rat [14]. The rationale for avoiding or diminishing inflamation with non-steroidal antiinflammatory drugs (NSAID) is then evident, although this therapy must be applied with care in osteoarthritic patients [15]. Some authors have injected non-steroidal antiinflammatory drugs inside the knee cavity. Tenoxicam, a water soluble NSAID, has been shown to be devoid of potential general or local side effects when used intraarticularly and similar quantitatively to the effects of bupivacaine although longer lasting than the local anaesthetic [16].

Differing reports offered in the literature may be related to whether an NSAID was utilized postoperatively for its antiinflammatory and analgesic properties. The potential role of the antiinflammatory properties of the local anaesthetic must also be considered. Our results suggest that if antiinflammatory therapy is effective, opioids will lack enough substrate of peripheral receptors upon which to exert their pharmacological activity. Hence no significant differences will be found between patients who received or did not receive intraarticular opioids.

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