

The IAAS, making history!

Claude De Lathouwer

The fourth European Congress and the second International Congress on Ambulatory Surgery were held April 14–18, 1997, in London. The success of the first congresses held in Brussels was continued. The program was excellent in every respect, and included more than 1100 participants from approximately 40 countries. Exhibitors were equally numerous. The international congress, the first and most important of its kind, was well up to par. Doubtless the changing of the venue of the congress every 2 years to a new city is going to increase considerably the impact and influence of the International Association for Ambulatory Surgery (IAAS). The next congress will be held in Venice from April 25–28, 1999.

After many months of negotiations, Elsevier, publishers of the journal *Ambulatory Surgery*, and the IAAS, have agreed that from now on *Ambulatory Surgery* will be the official journal of the IAAS. At present, it is the only international multidisciplinary journal dedicated to ambulatory surgery. There will be considerable benefits for individual members of associations affiliated with the IAAS.

To date, the great majority of associations dealing with ambulatory surgery in the world have joined the IAAS. Many associations have likewise been formed at the instigation of the IAAS or of its members.

The IAAS is clearly successfully achieving its statutory objectives, that is to become the foremost international, multidisciplinary forum on ambulatory surgery, to promote the establishment of national associations and to facilitate useful contacts among them.

Given that the concept and development of modern ambulatory surgery responds to the major challenge in society to control health costs while maintaining quality care, clearly the IAAS now represents, on both national and international levels, an important political and scientific tool whose role is expanding. In this respect, the founding of the IAAS undoubtedly marks a notable achievement in the history of modern ambulatory surgery.

We are making history!

Claude De Lathouwer Past President, IAAS

James H. Nicoll Memorial Lecture

A quarter century of accepting the challenges while avoiding the pitfalls of ambulatory surgery

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As modern surgery developed during this century, a series of events chronicled by several courageous physicians laid the foundation upon which ambulatory surgery rose to the prominence it commands today. Their pioneering reports insightfully addressed the importance of selection, selection of appropriate patients, selection of appropriate procedures.

The practice of ambulatory surgery was first documented in the medical literature in 1909 when James H. Nicoll, a Glasgow surgeon, addressed the British Medical Association [1]. Nicoll said, "I desire to bring forward certain views concerning surgical operations in infants and young children. During the past 10 years, the work in the outpatient clinic at the Glasgow Royal Hospital for sick children has included some 9000 operations (strictly speaking 8988); nearly one-half of them were children under 3 years of age, a large proportion of them being infants under a year.

(In that group of operations) we have performed tendon repairs, cleft lip and cleft palate surgery, elevation of depressed birth fracture of the skull, pyloromyotomy and hernia surgery. All 8988 were treated as outpatients...

A much larger share of the operative work of a children's hospital than is even now so treated should be done in the out-patient department... The treatment of a large number of the cases at present treated indoor constitutes a waste of the resources... The results obtained at a tithe of the cost are equally good... We keep similar cases in adults too long in bed.

Sucklings and young infants should remain with their mothers after operation... Even when the child is bottle-fed, separation from the mother is often harmful... For 7 years I have had a small house, near the Glasgow

Children's Hospital for the accommodation of young infants and their mothers. The mothers are catered for, and themselves nurse their infants... No children's hospital can be considered complete which has not, in the hospital itself or hard by, accommodation for a certain number of nursing mothers whose infants require operation".

Nicoll felt the ambulatory surgical setting was best for infants and young children because, "with their wounds closed by collodion or rubber plaster, (they) are easily carried home in their mother's arms, and rest there more quietly, on the whole, than anywhere else. They are visited at home by the hospital sisters."

James H. Nicoll, ambulatory surgery pioneer, ambulatory surgery visionary.

In 1916 Ralph Waters, often referred to as the father of the specialty of anaesthesiology in the United States, opened the Down-Town Anesthesia Clinic in Sioux City, Iowa, for minor surgery and dental cases—a prototype of today's freestanding center [2].

He told of providing anaesthesia services and surgical facilities to suit local dentists and patients who in Water's words "objected to going to the hospital because of the time and expense involved... And to surgeons (who were) also anxious to establish extra hospital clinical facilities... (A) careful physical examination (is made) on all suspicious risks... A sphygmomanometer and stethoscope are constantly present and frequently used... The well trained and alert assistant is useful (for she) often warns me that the next patient is short of breath or shows some other evidence of needing careful examination".

Waters concluded, "As to the satisfaction of my patrons, I think I can say this: There are none who have fault to find with our work. We aim to keep an abundant supply of nitrous oxide and oxygen and use it freely. Many patients and some doctors object to the

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fees, but they come back and their friends come back. Satisfactory anesthesia and too large fees work out better than bargain sale fees and unsatisfactory anesthesia... People forget the fee, but they never forget the hurt nor fail to tell their friends about it... The future for such a venture, I believe is bright. When the war is over, I trust many of you may develop downtown minor surgery clinics of much larger scope”.

It was not until the 1960's that the messages of Nicoll and Waters were heard. An ambulatory surgery program was initiated in 1962 at the University of California at Los Angeles (UCLA); Cohen and Dillon in 1966 published their report, “Anesthesia for Outpatient Surgery”, in the *Journal of the American Medical Association* [3]. They concluded, “It is possible to conduct a program of anesthesia for outpatient surgery without compromising patient safety... Safety of the patient is not a matter of inpatient versus outpatient. Safety is an attitude, and, where good practice is followed in selection of patients by the surgeon, with careful preanesthetic evaluation and careful anesthetic technique, there is no reason to expect more complications than (with) hospitalization”.

An ambulatory surgical facility within the hospital but separated from the hospital's operating suite was opened in 1966 at George Washington University (GWU), Washington DC. Levy and Coakley, in November 1967, reported on the first year of “in and out-surgery” [4]. A review of the published proceedings stated, “The authors report an interesting and successful experiment in providing surgical procedures for ambulant patients. The advantages are immediately obvious in these days of shortages in beds and manpower”.

The selection process reported by the University of California at Los Angeles and George Washington University became the guideline for startup programs:

- The patient must be in good health or having a systemic disease, it must be under good control.
- Surgeons are encouraged to send patients for an anaesthesia interview if they have concern about the patient's health status or if the patient is concerned about their anaesthesia.
- Operative procedures best suited are those of short duration (less than 90 min) associated with minimal bleeding and minor physiological derangement. Infected cases are rarely considered.
- Anaesthetic management is not a crucial issue if health status of patient and type of surgery are carefully considered.

Wallace Reed and John Ford, two Phoenix, Arizona anaesthesiologists developed an ambulatory surgery facility outside the administrative umbrella of a hospital, outside the hospital campus. The Phoenix Surgicenter, a freestanding facility, opened in 1970 [5,6]. The term surgicenter was originated by Wallace Reed. A plaque

in its lobby proclaims, “Dedicated to the principle that high-quality outpatient surgical care can be provided in a caring personal environment, in a freestanding ambulatory facility at a lower cost than other alternatives”.

In an article that appeared in October 1969 discussing the surgicenter as an innovation in the delivery and cost of medical care, Wallace Reed and John Ford wrote “The surgicenter is a response from the private sector to the many urgent appeals from the government, labor, industry and the medical profession to streamline the delivery of medical care and reduce its cost” [5]. The opening of the Phoenix Surgicenter was a landmark accomplishment, earning Reed and Ford the prestigious Lambert Award for their outstanding contribution to medical care in the United States.

As the word spread, physicians, health care professionals, administrators and government agencies sought a means of coming together to learn from each other about the new way of providing surgical care at lower cost:

- Care without the need for lengthy hospitalization
- Care that freed up hospital beds that were in short supply
- Care that maintained quality without disruption of the family unit
- Care that limited exposure to cross infection

To meet this need, the Society for the Advancement of Freestanding Ambulatory Surgery Care was established in 1974; it is now known as the Federated Ambulatory Surgery Association (FASA). Wallace Reed was a founder and first president. Currently, there are more than 2300 freestanding centers in the United States where over 4.2 million surgical cases were performed during the past year. There are over 2900 individual members of FASA.

The Society for Ambulatory Anesthesia (SAMBA) was organized in 1984. At an ambulatory anaesthesia meeting, I raised the issue “I feel the time is right to develop an outpatient anaesthesia specialty society”. Seated at the table were, Burton Epstein, Surinder Kallar and Harry Wong; the response was positive. I became SAMBA's first president. The other three were elected in the order mentioned. Membership today exceeds 4500.

During the mid 1980's, 3-day surgery units in the United Kingdom were recognized as leading facilities:

- Addenbrooke's Hospital, Cambridge—Tom Ogg
- Kingston Hospital, Surrey—Paul Jarrett
- Barnet General Hospital, London—Sarah Penn

Ogg, Jarrett and Penn assumed leadership roles in the founding of the British Association of Day Surgery (BADs) in 1990. All three have been president.

Claude De Lathouwer, in 1991, in Brussels, Belgium, brought together leading authorities from throughout the world to participate in the first European Congress on Ambulatory Surgery. This beginning led to the

formation in 1995 of the International Association for Ambulatory Surgery (IAAS). Claude De Lathouwer became the first president.

Four cornerstones formed the foundation upon which an ambulatory surgery skyscraper was erected:

- Reports of James Nicoll and Ralph Waters
- Ambulatory surgical programs in the USA (UCLA, GWU), and the UK (Addenbrooke's, Kingston, Barnet General)
- The freestanding Phoenix Surgicenter
- FASA, SAMBA, BADS and IAAS supported by societies and individuals from many countries, providing the educational and collegial venues necessary to further interest and growth in ambulatory surgical care.

For those physicians and facilities that led the way, the challenges faced became the challenges met:

- Addressing potential pitfalls
- Publicizing successful outcomes
- Championing the acceptance of ambulatory surgery.

In a presentation during the 1970's I said, "The success of ambulatory surgery depended upon the five Ps:"

- Provider education
- Procedure selection
- Patient selection
- Post anaesthesia care
- Payer education

I shall briefly discuss each looking at where we were a quarter century ago and where we are today.

Provider education: Surgeons are still the initial contact; to this day they must have guidelines: what constitutes an acceptable procedure; an acceptable patient; when to contact the anaesthesiologist for early consultation with patients who are not ASA physical status one or two. Anaesthesiologists continue to limit the use of traditional premedicants, long acting drugs, agents that increase morbidity. Initially regional anaesthesia (spinal, epidural) was viewed with caution for the day-surgery patient. Today, regional techniques are well accepted alternatives to general anaesthesia. Nursing staff paradigms shifted from traditional methods of care of the sick hospital patient to caring for the healthy day-surgery patient. Success is still dependent upon physicians, nurses, non professional staff, patients and family members understanding and accepting the nuances of participating in compacted perioperative care.

Procedure selection: With new surgical techniques and technology we have moved far beyond UCLA and GWU criteria; we have vaulted beyond Wallace Reed's early procedure criteria "almost any operation which does not require a major procedure in the abdomen, thorax or cranium is acceptable" [7].

Patient selection: Whereas initially selection was limited to American Society of Anesthesiologists (ASA)

physical status one or two, or an occasional patient whose systemic disease was under good control; presently we are seeing a number of patients with considerable pre-existing disease assumed to be under optimal control, an increasing number of challenging infants and octogenarians.

Patient evaluation in advance of the day of surgery (visit, telephone), important then and even more important today, it continues to limit last minute postponement or cancellation and provides for a more efficient operating room schedule. At Stanford University (California, USA) a preoperative evaluation clinic directed by anaesthesiologists has proven to be cost effective: 88% decrease in day of surgery cancellations; \$112 per patient decrease in preoperative testing costs; decrease in cardiology and pulmonology consultations [8].

To this day, we cannot only rely on the surgeon's office evaluation—still too cursory, usually directed toward the surgical problem. Facilities still need a brief but informative questionnaire that allows the anaesthesiologist to assess anaesthesia risk and plan for care; allows the facility staff to plan for special needs (positioning for the patient with arthritis, history of substance abuse, a hearing aid that should be left in place, locating a responsible adult for home care).

The basic tenets for patient selection have not changed. Patients should:

- have any medical problems well controlled
- accept the responsibility of postoperative care after discharge
- be accompanied home by a responsible adult

We must never become too cavalier; careful selection remains the keystone for successful outcome. However, arbitrary limits placed upon type of surgery, age of patient, or duration of procedure appear to be unwarranted.

Post anaesthesia care: Postoperative information (what to expect when at home, contact telephone numbers) should be explained to the patient and the responsible adult at a level that is easily understood by both—a printed copy should be given to them. The facility must have documented protocols and criteria that are applied consistently. Every effort must be made to assure a safe and smooth transition to the home setting. Essential then, essential today, essential tomorrow.

There has been a steady, albeit slow move away from time-based recovery where the patient is required to stay for a minimum amount of time, unrelated to clinical activity level, and replacement by criteria-based recovery where patients who meet specific criteria are considered ready for discharge, regardless of time spent. Today, even though time-based recovery still exists in some facilities, the requirement for a post anaesthesia care unit (PACU) stay is being questioned by other facilities. Patients who receive short-acting anaesthetics,

local anaesthesia with sedation, or regional blocks are being moved directly from the operating room to a secondary, less intensive recovery area if specific discharge criteria are met. Preliminary results from a multicenter study conclude: patients can safely bypass the labor-intensive first phase of post anaesthesia care (70–100% of patients receiving local anaesthesia with sedation; 13–40% of patients who received general anaesthesia) [9]. On average, time spent in the less intensive phase II recovery unit was either the same or shorter than the duration of stay for patients who were initially admitted to the phase I unit.

Recovery care is truly in a state of flux, on the one hand, as some facilities attempt to bypass the PACU, other day-surgery units are expanding their recovery care, providing 24–72 h of care for patients who have had more complicated procedures, in a continuing attempt to contain costs and to avoid use of hospital beds. Assessment of patient needs and time spent in the PACU is becoming an increasingly relevant issue, from both a clinical and cost standpoint.

The rate of unplanned admissions following day-surgery appears stable; varying among facilities, but with experience gained, averaging 1% despite the increasing complexity of patients and procedures. The leading causes continue to be vomiting, pain, bleeding and more extensive surgery than planned.

Payer education: In a quarter of a century we have moved from educating payers about the safety and cost effectiveness of outpatient procedures to educating payers that all procedures and all patients are not acceptable for ambulatory surgery.

Whereas initially a shortage of hospital beds was the impetus for ambulatory surgery, attempts to control the cost of health care has fueled most of the recent growth. By the end of this decade, it is expected that over 70% of all elective procedures in the US will be performed on an ambulatory surgical basis. Similar patterns are expected throughout many other areas of the world. We will be continually challenged to merge excellence of care with lowering of cost. Extrinsic pressures must never cause us to lose sight of the special needs and challenges of the ambulatory surgery patient.

In the 21st century, there will be increasing pressure from government, industry and healthcare payers to perform more complex ambulatory surgical procedures, to manage increasing numbers of patients with health

problems. Although the hospital is still a most important player, the surgical pie is being further divided as more procedures move away from the hospital to free-standing surgical facilities and physicians' office surgeries. Where a surgical procedure is performed should remain a medical decision and should not be dependent only upon cost or reimbursement.

Our past accomplishments must not lull us into a state of complacency. We still have not had sufficient outcome studies to definitively answer questions posed a decade ago by Burton Epstein:

- How do we identify the inappropriate patient?
- What are the risks of anaesthetizing the geriatric out-patient?
- Should all patients be evaluated prior to the day of surgery? If so, how?
- Are any laboratory tests required preoperatively in the young and healthy patient?
- Should all patients be required to tolerate fluids by mouth and void prior to discharge?

We must continually reassess patient and procedure selection, laboratory and diagnostic testing, choice of anaesthetic drugs and techniques, post anaesthesia care, discharge criteria, causes of unplanned admission. Every ambulatory surgery facility must develop action plans based upon outcome data. Patient safety must always be everyone's primary objective.

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Complications following day surgery: Is quality assurance the answer?

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Abstract

As the scope of modern day surgery continues to expand, the assurance of quality will assume greater importance. Current day surgery is mostly associated with minor morbidity, although the future may see an increase in more major complications. If quality assurance programmes are to be used in the maintenance of quality for future day surgery, it is essential that such programmes utilise an agreed set of quality indicators and standards of practice that highlight the relative impact of such complications on those involved. © 1997 Elsevier Science B.V.

Keywords: Day surgery; Quality assurance; Complications; Quality indicators

1. Introduction

In the UK the scope of day surgery has expanded dramatically over the last 10 years, and there is considerable pressure, both governmental and financial, for such expansion to continue. Guidelines concerning patient, operative and social selection criteria are changing to allow sicker patients to undergo more extensive day surgery. So much so, that when setting selection criteria, only two fundamental questions have to be considered. Firstly, would anything be done differently if a particular patient had a particular operation but as an inpatient? Secondly, is there a significant risk of complications occurring post discharge, in spite of the patient having been kept in the day surgery unit for a period determined by the operation undertaken and the patient's specific characteristics?

Close scrutiny of the complications that occur following day surgery is therefore of fundamental importance. If day surgery is to fulfil its potential, both in terms of the numbers of patients treated and the scope of operative procedures undertaken, it is essential to know how patients fare post surgery, and particularly post discharge. Again there are two important issues at stake here. Firstly that standards of excellence are in no

way compromised by the pressure for expansion, and secondly that those working within the field of day surgery are aware of the extent of the burden placed on general practitioners and community medical services. Although Osborne and Rudkin [1] found that at early follow-up only 4% of day case patients had presented to general practitioner and 3.1% had attended a hospital Accident and Emergency department, Fletcher et al. [2] found that in the first 5 days after day surgery, nearly half of all patients required some form of primary health care intervention, with half of these occurring in the first 2 days. Thus, it would appear that day surgery already imposes a significant workload on community health services and it is likely that this burden will increase in the future.

2. The scope of future day surgery

The scope of future day surgery will depend upon the definition of sensible limits of day surgical practice. After all, not all patients and operations are suitable for day surgery and future guidelines need to recognise these limitations. So what are these limitations; the limits to providing high quality day surgery, meeting the needs of patient, purchaser, provider and community? How will these limitations change with the devel-

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opment of new surgical techniques, different anaesthetics, and the altered provision of community care? The practice of continuous quality improvement is now essential as it is only by undertaking ongoing quality assurance programmes that we can assess, and thus assure, the quality of service we are providing, both at the present time, and in the future.

3. The benefits of quality assurance

It is worth clarifying the potential benefits such programmes make available to us. The principle benefit of such programmes is to assure quality; to answer the fundamental question 'Where is your evidence that local clinical activities really are meeting the required standards?' Equally important, however, quality assurance programmes can introduce and vet change. Change is inevitable for as George Bernard Shaw warned "Progress is impossible without change and those who cannot change their minds cannot change anything." In the past doctors and nurses have rightly been accused of 'shroud-waving' in order to obtain funding for any desired change. In the future, if not the present, resources will only be allocated if a proven need exists. Quality assurance programmes can play a vital role in providing just such proof. Finally it must be remembered that quality assurance can be of enormous benefit in the sphere of postgraduate and continuing medical education, after all De Lacy [3] has pointed out that there is no more powerful educational tool than audit.

4. What complications of day surgery should our quality assurance programmes focus on?

Traditionally, quality assurance programmes have divided their attention between what Donabedian [4] describes as "structure, process and outcome", although this rationalisation has not helped the British Day Surgery in deciding what constitutes quality care. Few would argue that outcome measures are the most important in determining the quality of day surgical care, the best studied of which includes unanticipated admission and readmission, patient satisfaction and postoperative complications.

4.1. Admission

Unanticipated hospital admission represents the most widely used outcome measure of quality day surgical care. After all admission represents a fundamental failure of our stated aim of admitting, treating and discharging our patients in the same day. The incidence of unanticipated admission is said to vary between 0.1 and

5% [5,6]. More recently Osborne and Rudkin [1] in 6000 patients and Ogg et al. [7] in 31 000 patients have found the admission rate to be around 1.4%.

It is known that certain types of surgery are more likely to be associated with postoperative morbidity and admission. Chung (1995) [8] found that patients who underwent certain types of surgery such as gynaecological and general surgery, had a six-fold increased risk of developing persistent symptoms in the day surgery unit, which in turn was correlated with increased symptoms 24 h postoperatively and admission. Similarly Ogg et al. [7] have recently found that nearly half of all admissions in his series had undergone gynaecological surgery although the highest admission rates as a percentage of all cases performed in each type of surgery occurred in general surgery, closely followed by gynaecology and dental surgery.

Further examination of the reasons for these admissions reveal that it is minor, and not major, problems that most commonly cause admission, the more common anaesthetic complications being pain, nausea and vomiting and delayed recovery, while the most common minor surgical complications were bleeding and unplanned extensive surgery. Social reasons for admission are uncommon with only 0.08% of admissions being caused in this way [7]. The most common reasons were the lack of home carers and escorts but such figures are proof that nurse based assessment systems, guided by medical protocols, work very well indeed. Such figures highlight two further important facts. Firstly that we must look further than simply admission rates and note that while several studies have claimed low admission rates, such studies often conceal much higher re-admission rates. Chung's [8] study found an admission rate of only 0.2% whereas the re-admission rate 24 h to 2 weeks after discharge was 1.4%. Secondly studies of admission rates emphasise the importance of high quality patient selection. Tuckey et al. [9] found that when day case laparoscopic cholecystectomy was attempted in unselected patients, only 31.1% of patients were fit for discharge at 6 h after surgery, and even after 24 h the admission rate was still 12.5%.

4.2. Mortality and major morbidity

The complications that occur following day surgery have been classified by Natof [10] into major and minor. Thus, a major complication is an untoward response or abnormal condition having the potential for serious harm while a minor complication has no potential for serious harm. Mortality studies in day patients frequently reveal that this is a very rare complication of day surgery. Several studies have found the mortality following day surgery to be between 1:20 000 and 1:66 000 [11,12]. The weakness of most studies into anaesthetic related deaths is that reporting is retrospec-

tive and on a voluntary basis. It is thus possible that under-reporting may contribute to the low mortality rate associated with day surgery.

Of the major complications that occur following day surgery, the best studied are myocardial infarction, pulmonary embolus, respiratory failure and cerebrovascular accident. Warner et al. [12] prospectively studied the incidence of these complications in a large population of adult patients and found the incidence of major complications to be 1:1455, and several studies have highlighted the fact that major complications following day surgery are surprisingly uncommon. On the other hand, day surgery is often associated with a wide variety of minor complications. Whilst major complications, with their potential for serious harm, are obviously important, in many ways, due to their relative frequency, it is minor complications that are of greater concern. After all, Phillip [13] showed that 86% of day case patients complain of at least one minor problem after discharge.

4.3. *Minor morbidity*

To some extent the type of minor morbidity described in the day surgery population is determined by the types of symptomatology sought by investigators. Chung et al. [14] found the most common complaints at 24 h following day surgery were pain, nausea and vomiting, headache, sore throat, drowsiness and lethargy. It is interesting to note that these incidences are remarkably similar to those published by Ogg [15] over 20 years ago, despite changes in anaesthetic and surgical techniques. Chung et al. [16] have gone on to show that the type of surgery plays a role in determining the postoperative minor morbidity at 24 h. Several studies have shown that certain day case operations, notably gynaecological laparoscopy, are associated with a high incidence of minor morbidity.

5. Is quality assurance the answer?

If we are to use quality assurance programmes to reduce postoperative morbidity following day surgery we must realise that simply measuring the incidence of major and minor complications is not enough. Current quality assurance programmes require further refinement especially as Davies and Crombie [17] have highlighted that there are problems associated with over reliance on outcome data. Outcome measures have limitations in that they are only useful when compared with data from a different institution or from the same institution at a different point in time. Such comparisons are fraught by case mix differences, as can be seen in the comparison of admission rates between two day case units, one performing all cases under general

anaesthesia, while the second using exclusively local and regional techniques. Also, Wilson and Cleary [18] have pointed out that many outcome measures are 'soft' in terms of both validity and reliability, again frustrating meaningful evaluation of the outcomes achieved.

Further difficulty lies in the definition of a suitable standard of practice for our quality assurance programme. How do we decide how much pain is acceptable in what percentage of patients and for how long? This leads us to ask some fundamental questions. Firstly, 'When does minor morbidity become a complication?' and secondly, 'What is it about morbidity that makes it important enough to be considered either worth preventing or as an indicator of quality, and to whom is it important?' Minor morbidity is not always of minor significance to patients.

The basic premise of day surgery is that surgery and anaesthesia can be safely performed to meet the same degree of excellence as that achieved in the inpatient setting. While day surgery free from all morbidity is an ideal, inpatient treatment is often far from this standard of practice and so perhaps it is unrealistic to judge the quality of day surgery on the incidence of headache, sore throat or even pain and postoperative nausea and vomiting.

If we are to use quality assurance programmes in any meaningful way we need to know how the morbidity that we measure affects patients in terms of their satisfaction with day surgery, the time taken for their return to normal function and crucially, how that morbidity is managed, be it by the patient themselves, the district nurse or general practitioner, or even by the hospital. Furthermore, we must constantly bear in mind a comparison with inpatient care. If a patient undergoes a carpal tunnel decompression, it is not surprising that their return to work will be delayed, whether they have their operation as an inpatient or as a day case.

6. Conclusions

Day surgery is changing. In future the logical progression is to develop day surgery to incorporate both short stay surgery and 'day of surgery admission' (DOSA), making the most of the skills acquired in day surgical patient selection, anaesthesia and minimally invasive surgery. This in turn may mean that while most morbidity associated with day surgery is at present minor, the balance between major and minor morbidity may change. Quality assurance programmes will be an essential part of the activity of all day surgery units, to assure the quality of service provided. To be meaningful, however, such programmes must be developed from simply measuring the incidence of common forms of morbidity to measuring an agreed set of

Table 1
Suggested quality indicators for day surgery

Admission rate
Readmission rate (within 30 days)
Did not attend (DNA) rate
Cancelled on day of surgery (CODS) rate
Patient satisfaction/complaints
GP satisfaction/complaints/workload
Pain
Postoperative nausea and vomiting (PONV)
Return to normal function

identical quality indicators, which include information concerning patient satisfaction, return to normal function, and the method of management of any morbidity occurring. There is an urgent need to reach international agreement on a set of quality indicators for day surgery (see Table 1) and to include within these quality indicators both outcome and process measures. Finally we must begin to develop the link between quality and cost because what ever changes the future brings, we will always be required to provide cost effective quality care.

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Paediatric quality assurance

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1. Introduction

Ambulatory surgical facilities are rapidly changing from the traditional quality assurance (QA) methods that are directed at finding 'bad apples' towards prospective continuous quality improvement (CQI). The prospective approach seeks system changes that can be made before the fact to improve the work flow and enhance the delivery of quality service. CQI support the notion that systems and performances can be improved even when high standards appear to have been met. It is important to have an ongoing CQI program to minimize complications, educate personnel and continuously improve care.

Serious complications in pediatric ambulatory surgery are rare. A recent study of pediatric perioperative cardiac arrest showed that 'healthy' ASA 1–2 patients accounted for 20% of all cases. Anesthesia was responsible for 81% of these arrests. Cardiac arrest in these patients (27%) was most likely to result from problems with drug administration such as drug overdose or injecting the wrong drug but was associated with 100% survival [1]. Minor problems on the other hand are not uncommon.

At Children's National Medical Center (CNMC) in Washington, DC, intraoperative and immediate postoperative events are entered by the anesthesiologist on a pocket-sized card that is collected at the end of each working day. The entries are grouped by categories that are pre-printed on the form. Postoperative follow-up telephone calls are made by the nursing staff to detect later complications or compliments. Monthly meetings are conducted to review the summary of the findings

and recommend improvements. Additional ad hoc projects and the results of clinical research studies are routinely used to further improve care. Some specific examples of recent protocols and findings are presented in the following sections.

2. Minimal acceptable age for ambulatory surgery

Most centers in the USA do not specify a minimal age for accepting an otherwise healthy full term infant for ambulatory surgery. Although there are no prospective studies of the perioperative risks of anesthesia and surgery in these infants, there are some anecdotal reports and case histories of postoperative apnea in some of these patients. Many centers have arbitrarily assigned minimal ages ranging from 2–8 weeks. Some will not accept infants less than 6 months old for ambulatory surgery regardless of physical status. This is particularly prevalent in free-standing facilities where there is no provision for extended postoperative observation if needed.

It is universally agreed, that the premature infant is not a suitable candidate for ambulatory surgery because of potential immaturity of the respiratory center, temperature control and gag reflexes. Recent studies have confirmed a high incidence of perioperative complications such as apnea in these infants.

The age at which the premature infant attains physiological maturity and no longer presents an increased risk for postoperative apnea must be considered individually. Criteria on which these decisions are based include growth and development, persistent problems during feeding, time to recovery from upper respiratory infections, history of apnea, and presence or absence of anaemia, metabolic, endocrine, neurologic, or cardiac disorders.

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It is generally considered that infants younger than 46 weeks postconceptual age (PCA) (which is the sum of gestational and post-natal ages) and/or a preoperative history of apnea or anaemia are at greatest risk, although some authors have reported apnea in infants as old as 60 weeks PCA. Children with lower gestational age are more susceptible to apnea. As the child matures, the tendency toward apnea greatly diminishes but the age when all infants may be safely anesthetized on an ambulatory basis is unknown. Until more extensive, prospective studies are carried out, it seems prudent to have a high index of suspicion. Most anaesthesiologists will not discharge home all ex-premature infants who are younger than 50 weeks PCA on the day of surgery [2]. At CNMC, they are admitted overnight (23 h) so that they may be monitored postoperatively for apnea, bradycardia, and oxygen desaturation. The choice of this particular age is rather arbitrary. It is best to individualize this decision and, when in doubt, to err on the conservative side. If the infant has bronchopulmonary dysplasia, anaemia or other neonatal problems, this period may need to be extended. Should any questions arise, inpatient care and postoperative monitoring are recommended. Infants with apnea in the recovery room should also be admitted and monitored.

3. Preoperative requirements and screening

The preoperative requirements for safe conduct of anaesthesia in paediatric ambulatory patients include a complete history and physical examination, indicated laboratory tests based on the findings from history and physical examination, consultations when indicated, and an appropriate fasting period. In order to minimize delays and cancellations, it is desirable to complete as many of these requirements as possible before the day of surgery.

Many ambulatory surgical units actively participate in the preoperative screening of their patients. The degree of involvement varies from a simple telephone call to the parents a day or two prior to surgery to the establishment of a formal screening clinic to clear all patients before admission into the operating suite. Many anaesthesiologists function as the medical directors of their facilities and perform the role of the perioperative physician. At CNMC, the parents of each child are contacted by telephone shortly after the operation is scheduled. A second call is made 48 h or less before surgery. During the initial call, information is sought concerning past or present risk factors, such as a history of prematurity or cardiac or respiratory problems. This information helps to determine if additional preoperative evaluation or consultation is required prior to the day of surgery. In

some cases, it may lead to a reevaluation of the appropriateness of scheduling the procedure on an ambulatory basis. Our experience at CNMC is that patients who are screened are 65% less likely to be canceled or have their surgery postponed than those who are not screened [3]. During the second phone call, an assessment of the child's present health is made. Fasting (NPO) orders are reinforced, and practical matters related to parking, what to bring to the hospital and expected duration of stay are explained.

On the day of surgery, all patients are screened for acute illness and NPO status. Vital signs are recorded. Any consultation reports are evaluated, and the need for special preoperative psychological or pharmacologic treatment is considered before the child arrives in the operating room.

4. Preoperative fasting

The need for a prolonged period of fasting (e.g. NPO after midnight) before anaesthesia induction in otherwise healthy children has been questioned [4]. Several studies have shown that ingestion of clear liquids up to 2–3 h prior to scheduled induction does not increase the risk of pulmonary aspiration syndrome. Consequently, some anaesthesiologists have altered fasting guidelines to allow clear liquids 2–3 h prior to surgery. It is important to note that these guidelines apply to clear liquids only (not solids) in otherwise healthy children. Possible benefits of shorter fasting times include minimizing thirst and discomfort while awaiting surgery, less hypovolemic-induced hypotension during induction and less concern about hypoglycemia. Recent studies indicate that many parents find it difficult to comply with the new more liberal guidelines. This is especially true when the patients are scheduled early in the morning because administering liquids at home would necessitate awakening the child much earlier than needed [5].

5. Preoperative testing

The value of preoperative routine screening tests for healthy infants and children has been questioned. Such tests as urinalysis and chest radiography are almost never indicated in the healthy pediatric ambulatory patient. The value of routine haemoglobin and haematocrit measurement continues to be debated. It is now performed in less than 27% of US centers; mostly in infants less than one year of age where the prevalence of anaemia is higher than in older children [6].

6. Pediatric perioperative environment

Essential components have been recently identified that make the perioperative environment satisfactory for the care of infants and children (Joint Commission on Quality Assurance of the Section on Anesthesiology of the American Academy of Pediatrics and the Committee on pediatric Anesthesia of the American Society of Anesthesiologists). These components address some unique aspects of the physiology, pharmacology and psychology of the child. Important care issues for children include the availability of techniques and/or equipment for airway management, fluid administration, temperature regulation, line insertion, monitoring and postoperative pain management. Serious airway or respiratory problems can occur rapidly and are often unexpected. It is assumed that a proper pediatric environment could reduce the risk of adverse events while providing immediate backup support for the care team when a crisis occurs.

The unique psychological needs of the child must be addressed in any ambulatory surgical facility. In an efficient facility, the time between the patient's arrival and the induction of anaesthesia is usually quite short. There is little time to orient the child to all the events that will take place during his or her stay. Most centers encourage children and families to participate in presurgical preparation programs a few days before surgery. Studies have shown that children who attended these programs were much more cooperative during induction than those who did not [7]. Such findings must be interpreted carefully, since parental motivation, traveling distance, socioeconomic conditions, and the child's age (the forces that motivate parents to bring their children to these program) are the same factors that may in themselves lead to better cooperation.

Another approach to facilitate the anaesthetic induction is to allow the parents to stay with the child during induction. Some institutions have specially built induction rooms where the parents can accompany their children without having to wear special operating room attire. Others allow selected parents (with a cover-all gown or scrubs) to walk with the child into the operating room itself. This approach is gaining a lot of support and is being requested by many parents. Studies have shown that children are less upset when the parents are present [8]. Parents selection and education are essential for the success of this approach since anxious parents can make their children even more upset.

7. Postoperative pain management

Children undergoing ambulatory surgery should receive proper attention to pain assessment and manage-

ment. Unfortunately, under treatment of pain in infants and children remains common despite a large number of studies demonstrating safe and effective treatment. Postoperative pain and discomfort in ambulatory children is best managed by the use of local and regional analgesic techniques such as caudal blocks, ilioinguinal and iliohypogastric nerve blocks, penile blocks, etc. local infiltration of the surgical incision is also effective. Mild analgesics such as acetaminophen or oral analgesics such as codeine or ketorolac are commonly used. Potent narcotic analgesics such as fentanyl can be used during and after surgery to prevent and/or treat more severe pain.

8. Discharge criteria

Rapid recovery and early ambulation are major objectives in ambulatory surgery. When dealing with paediatric ambulatory patients, we must guarantee safe discharge not only from the recovery room but also from the hospital. In our institution, all children recover from anaesthesia in the same recovery area. Ambulatory patients are then transferred to a special short-stay recovery unit.

In order to provide uniform care and to ensure a complete legal record, many institutions have developed specific discharge criteria for ambulatory patients. At CNMC, discharge criteria include the following: appropriateness and stability of vital signs; absence of respiratory distress; ability to swallow oral fluids, cough, or demonstrate a gag reflex; ability to ambulate consistent with the developmental age level; absence of excessive nausea, vomiting, and dizziness; and a state of consciousness appropriate to the developmental level. Recent studies suggest that children should not be required to drink before discharge from the hospital.

Every child, regardless of age, must have an escort home. The escort is given written instructions concerning the child's home care and a telephone number to call to request further advice or to report complications. Staff counsel all parents about postoperative care. Many units have also designed handouts that specify the care that should be provided and the signs that might herald a complication.

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Epidual and spinal anaesthesia have no place in a busy day unit?

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Abstract

Properly performed day-care anaesthesia is almost 100% safe in terms of serious adverse outcome, regardless of which anaesthetic method is used. The drawbacks of spinal anaesthesia includes occasional postoperative headache and transient radicular irritation. Epidural anaesthesia may prolong preoperative time consumed and occasionally fail. Both methods may prolong postoperative bedrest, but provide better analgesia and emesis protection than general anaesthesia. Epidural anaesthesia may occasionally be useful in selected long-lasting procedures. Spinal anaesthesia is simple, fast, reliable and should be considered for procedures of medium to long duration when some postoperative pain is expected. © 1997 Elsevier Science B.V.

Keywords: Spinal anesthesia; Epidural anaesthesia; Ambulatory surgery

1. Introduction

Whereas epidural and spinal anaesthesia are generally accepted for many types of in-patient surgery, their use in an ambulatory setting has been controversial. Some ambulatory units do not use these methods at all, whereas other use them for 20–40% of their adult outpatients [1]. Thus, a careful examination of the characteristics of these methods with special reference to the ambulatory surgical patient, seems warranted. Important aspects which should be taken into consideration include the safety, quality and economy associated with the use of epidural or spinal anaesthesia. Alternative methods may be either general anaesthesia, local anaesthesia or monitored anaesthesia care (MAC). Whereas the two latter methods may prove excellent results in skilled hands for appropriate patients, the emphasis in this discussion will be on the alternative of general anaesthesia.

2. Anaesthetic safety

In his survey of 45 090 ambulatory surgical patients, Warner et al. concluded that major morbidity and mortality were comparable with a non-surgical population [2]. A total of 4059 of his patients received regional anaesthesia, and when asked 1 month after surgery, reported no higher incidence of major complications compared to general anaesthesia, [2]. However, in present anaesthetic practice, major permanent harm from anaesthesia is so rare that it is very hard to show differences between anaesthetic methods in any reasonably sized study population [3]. Thus, the study of potential 'worst case' problems and case reports must also be used for safety considerations.

2.1. Safety problems with general anaesthesia

The most frequent safety problems [4] with general anaesthesia refer to respiratory depression and problems with control of free airways and adequate ventilation. In the fragile patient the cardiodepressant effect of most general anaesthetic agents may also be a concern; whereas rare cases of anaphylactoid reactions, malignant hypertermia and organ toxicity may cause life-threatening situations.

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2.2. Safety problems with epidural or spinal anaesthesia

Whereas respiratory and airway problems are very rare with these techniques, cardiovascular complications may be a concern [5]. Hypotension at the onset of the block may be a problem, and occasional reports of bradycardia and even cardiac arrest have evolved from high thoracic blocks in susceptible patients [6]. With epidural anaesthesia, general convulsant and cardiodepressive effects from large doses of local anaesthetic drugs injected inadvertently into the general circulation, may cause serious problems. With both epidural and spinal anaesthesia, neurologic damage to the spinal nerves or the spinal cord may evolve as a result of neurotoxicity from local anaesthetic drugs. Needle tearing into nervous tissue or formation of a haematoma or abscess after the needle puncture may cause mechanical damage. Whereas paraesthesia may occur during administration of epidural or spinal anaesthesia, these should not result in permanent damage in an awake patient when the needle is withdrawn and the injection stopped [7]. In a large prospective study of mostly in-patients, 8501 cases of spinal anaesthesia resulted in three permanent lesions. Two of these patients received continued injection in spite of pain, in one cancer patient 100 mg lidocaine in a 5% solution were administered [8].

2.3. Neurotoxicity

This complication has been a major concern especially after spinal anaesthesia, when high a concentration of local anaesthetic drug is put very close to the cord or nerve tissue. At present it seems justified to identify two different forms of toxicity; the permanent toxic nerve injury and the transient radicular irritation (TRI).

2.4. Permanent toxic nerve injury

Whereas bupivacaine in clinical concentrations is considered safe in this aspect, reports of permanent nerve or cord damage have been encountered after tetracaine and lidocaine. On an isolated frog nerve, lidocaine 5% is toxic within 15–20 min, whereas less than 1% in solution is safe [9]. From the clinical reports, it seems likely that too many molecules of lidocaine concentrated at a spinal site may cause damage. The most serious reports have been after repetitive administration of lidocaine through spinal catheters [10], but repeated lidocaine spinals and single lidocaine spinals of 100 mg or more in a 5% solution have also caused permanent damage [11]. It is reason to believe that the use of lidocaine in a 2% solution or less may eliminate the problem of permanent nerve damage. If the 5% solution is used, care should be taken to restrict

the dose to the 50–80 mg range, to dilute the injectate with spinal fluid aspiration and to never inject a second lidocaine spinal if the first fails.

2.5. Transient radicular irritation (TRI)

Whereas concentrated spinal lidocaine is the usual cause of this complication as well, TRI seems to be a different clinical entity compared with the permanent toxic nerve injury. TRI is mild, self-limiting within few days, without neurological signs of nerve damage. The symptoms include pain or dysaesthesia in the back or buttocks, radiating down the legs. With 2 or 5% lidocaine an incidence of up to 5–16% has been described, whereas the condition is rare with bupivacaine [12,13]. It is more frequently seen in patients after the lithotomy position, whereas the baricity or addition of epinephrine to the spinal injectate do not seem to make any difference [12,13].

2.6. Haematoma or abscess formation

These complications may be very serious if surgical decompression is not initiated within a few hours of onset of symptoms. With aseptic technique in outpatients with stable health, abscess formation should be almost non-existent. In the series of more than 18 000 epidurals and spinals reported by Dahlgren and Tornebrandt [8], no cases of infection occurred but three cases of hematoma caused permanent neurologic deficits. These were all after epidural anaesthesia prolonged for post-operative pain treatment in in-patients using anticoagulants [8]. Again, with appropriate technique [14] and patient population, hematoma formation should be extremely rare after epidural and spinal anaesthesia in an ambulatory surgical practice.

3. Problems of anaesthetic quality

As serious safety problems become very rare in modern anaesthetic practice, the focus of attention has been somewhat shifted as to the quality of care experienced by the patients.

3.1. Quality problems with general anaesthesia

Almost all cases of adult ambulatory general anaesthesia are induced with injection of propofol, which may cause localized pain [15]. When neuromuscular blocking agents are used as part of the technique, there is always a small risk of inadvertent awareness during the procedure, which may cause serious psychiatric problems afterwards [16]. The patients may feel very drowsy and complain about pain, nausea or vomiting after general anaesthesia. Sore throat may be a result of

intubation or the use of a laryngeal mask [17], whereas use of suxamethonium may result in muscle aching [18].

3.2. Quality problems with epidural and spinal anaesthesia

Skin puncture with the epidural or spinal needle may be unacceptably painful and frightening in some patients [19]. Use of local anaesthetic skin ointment, fine needle local anaesthesia infiltration or i.v. opioids in front, may alleviate the pain; but a reassuring talk is usually sufficient for most patients. Occasional cases of block failure may result after epidural anaesthesia, but should be very rare after spinal anaesthesia in experienced hands. However, also with spinal anaesthesia the option of giving general anaesthesia should be at hand if the surgical procedure outlasts the duration of the block. With both epidural and spinal anaesthesia per-operative nausea may be a problem if care is not taken to avoid hypotension. A positive quality feature with these blocks are the choice of per-operative options which may be offered to the patients. Some patients want to be awake and discuss the case with the surgeon or watch the surgery on a monitor, some want slight sedation or music on headphones, some want to be asleep. Epidural and spinal anaesthetic patients, in general, have less postoperative pain and less nausea or vomiting compared with patients receiving general anaesthesia [19–21]. However, quality problems may arise after discharge in terms of transient radicular irritation (see above) and post-dura puncture headache (PDPH).

3.3. Post-dura puncture headache (PDPH)

An accidental dura puncture [22,23] with a large bore epidural needle may have a risk of PDPH of about 50%. Spinal anaesthesia with 25 G Quincke needles have been reported to carry as much as a 37% incidence of PDPH in young men [24]. However, with present available thin needles with an atraumatic tip design (i.e. 27 G pencil point), the PDPH figures should be less than 2%, even in young adults [22]. It should also be remembered that PDPH is benign and self-limiting, usually within a few days. If the symptoms are strong, epidural blood-patch treatment is immediately efficient in 90% of the cases [22].

4. Economic considerations

Better cost-effectiveness is one of the major driving forces in the development and growth of ambulatory surgery. When comparing epidural and spinal anaesthesia with general anaesthesia in this setting, important aspects include costs of drugs and equipment, as well as delays and extra work with either method [21].

4.1. Drugs and disposable equipment

Although drugs and disposable equipment accounts for a minor part of overall anaesthetic costs, differences may still be of interest. Spinal and epidural drugs and equipment are generally cheap; whereas many of the new and best drugs for general anaesthetic ambulatory care are more expensive; including propofol, sevoflurane, ondansetron, remifentanyl and muscle relaxants.

4.2. Peri-operative delays

Both spinal anaesthesia and particular epidural anaesthesia may take longer to administer than a general anaesthetic induction [21], and for the epidural block there is a delay while waiting for the block to become efficient as well. The latter may not be a problem if the unit has an induction room or the onset time is used to wash and drape the patient in the operating theatre. Postoperative delay with the epidural and spinal anaesthetic technique is mainly due to prolonged leg paralyses. In our study of knee-arthroscopy [21] leg muscle strength was impaired for 78 min post-operatively after lidocaine spinal anaesthesia and 124 min after mepivacaine epidural anaesthesia [21]. With dilute lidocaine 0.5% [25] or procaine [26] for spinal anaesthesia, total block duration may be shortened to less than 1.5 h. Occasional urinary retention may be a problem after epidural or spinal anaesthesia, but should be diminished by using short acting agents [22], avoiding bupivacaine.

With general anaesthesia, slow emergence may result in a delay to wheeling the patient out from the operating theatre [21]. Pain and nausea or vomiting are the most frequent causes of delayed discharge after ambulatory surgery and these occur more frequently after general anaesthesia [19,22].

4.3. Extra work load

After general anaesthesia a drowsy patient may require increased attention, as well as a patient with pain or nausea may do. Un-anticipated admissions are usually caused by these complications. With epidural and spinal anaesthesia post-dura puncture headache and transient radicular irritation may cause problems and extra work after discharge.

5. Conclusions

5.1. Epidural anaesthesia

Epidural anaesthesia provides excellent and adjustable per- and post-operative analgesia. However.

the method is associated with pre- and post-operative delay and has a risk of failure and accidental dura puncture. Epidural anaesthesia seems indicated only for special cases in an ambulatory setting; such may be prolonged orthopedic procedures, patients with a strong preference for the method and as a backup (i.e. spinal anaesthesia + epidural catheter) for spinal anaesthesia when the surgery is of very unpredictable duration.

5.2. Spinal anaesthesia

Spinal anaesthesia is easy, fast, cheap and reliable. As with epidural anaesthesia, the incidences of postoperative pain and nausea are low. The drawbacks are a possible delay of postoperative discharge and the occurrence of transient postdischarge side-effects in some patients. Spinal anaesthesia seems highly appropriate in an ambulatory clinic for procedures of medium to long duration, when some postoperative pain is expected. Cases of airway problems (e.g. rheumatoid arthritis, face down position on the table) and patients with a strong desire to being awake may be other indications. A proper technique should be used: only lidocaine in a 2% or less solution, 27 G pencil point needles to all patients less than 50 years of age.

With both epidural and spinal anaesthesia it is important that both the patient and the surgeon accept the method. All the patients should be informed about the symptoms of possible late side-effects. A telephone call the day after surgery should be undertaken.

With these guidelines; epidural, and especially spinal anaesthesia, should have a place in the busy day unit.

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Educational protocols in ambulatory anesthesia

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Abstract

To meet the needs of the professional and lay community for continued safe delivery of quality health care in ambulatory surgery, it is crucial to provide medical education in those aspects unique to ambulatory anesthesia. Formal educational protocols in ambulatory anesthesiology must begin at the medical school level, expand during anesthesiology residency training, and continue throughout professional practice. Additionally, ambulatory surgery and anesthesia is not provided in a vacuum, but is part of a system working to achieve the common goal of providing quality health care. Therefore, the continued education of the practicing anesthesiologist, as well as that of members of other sub-specialties (both physicians and non-physicians), in the protocols of ambulatory anesthesia is as integral to the future successful delivery of sustained quality care in ambulatory surgery and anesthesia as is the education of future anesthesia providers. © 1997 Elsevier Science B.V.

Keywords: Ambulatory anesthesia; Resident training; Continuing medical education

1. Educational protocols in ambulatory anesthesia

In response to escalating health care costs, the organization of the health care delivery system is undergoing a complete overhaul, a consequence of which is the dramatic shift of elective surgical procedures from institutional (hospital) based to the ambulatory setting. Current predictions are that by the year 2000, 80% of all health care in the US will be performed on an ambulatory basis, facilitated by newly developed technologies in the fields of ambulatory surgery and anesthesia (Fig. 1). The prospect of reduced and/or manageable health care costs remains a major impetus for the continued growth. [1] While over the past 10 years the percentage of ambulatory surgery procedures continue to increase dramatically, the number of residents in anesthesiology continues to decline (Fig. 2). Consequently, the formal education of residents in those principles and techniques unique to ambulatory surgery and anesthesia is crucial to the delivery of successful clinical service [2]. Exposure to ambulatory anesthesia and surgery should begin in medical school,

expand during anesthesiology residency training and continue during professional practice.

Formal, standardized education in the field of ambulatory anesthesiology must be an integral component of the resident experience because it promotes safe practice, while providing the resident with the opportunity for first-hand experience in dealing with clinical and non-clinical issues. Because the scope of clinical services overlaps with training in pediatrics, geriatrics, vascular, and pain, integration of the didactic and clinical por-

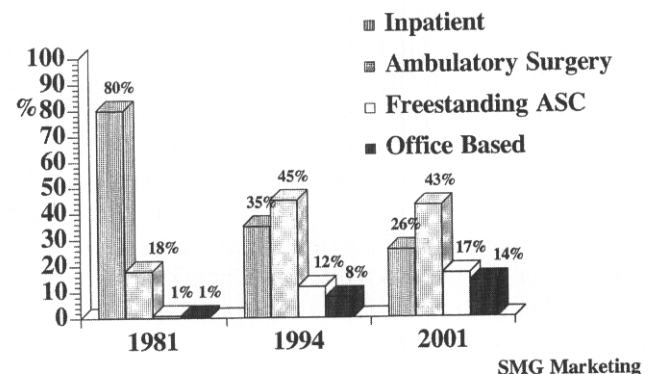


Fig. 1. Relocation in ambulatory surgery — past, present and future.

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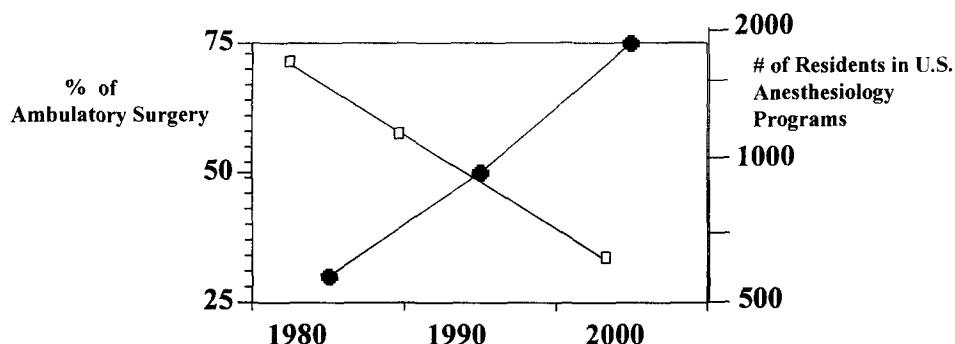


Fig. 2. Trends in ambulatory surgery and anesthesia resident education.

tions should be sought. However, there remains a significant dimension of education that is best served with subspecialty training in ambulatory anesthesia.

The Society for Ambulatory Anesthesiology (SAMBA) has developed Educational Guidelines for Subspecialty Residency Training in Ambulatory Anesthesia and recently revised its third edition [3]. These guidelines 'standardizes' for Program Directors the knowledge base and skills requirements for the resident anesthesiologist during the 3-year training period. The core curriculum proposed by SAMBA is intended to be covered during the 3-year Clinical Anesthesia Curriculum (CA 1–3 years). Guidelines exclude the 'Basic Anesthesia Training', which according to the American Board of Anesthesiology, emphasizes basic and fundamental aspects of the management of anesthesia and usually occurs during the CA-1 year. In conjunction with an annotated bibliography, the guidelines span the gamut of perioperative ambulatory anesthesia management. The curriculum concentrates on developing the anesthesia resident's role as clinical decision-maker and consultant in preoperative evaluation, didactic and clinical sessions in the pharmacology of short-acting inhalational and intravenous anesthetics, recovery room management (acute pain, post-operative nausea and vomiting (PONV)), and recognition and implementation of ambulatory discharge criteria. Further, the residency training experience would be expanded and enriched by participation in journal club, clinical case conferences, research and ambulatory anesthesia-related textbook readings. Anesthesia residency programs in the US have incorporated such a curriculum with clearly delineated objectives.

The newly instituted Residency Review Committee (RRC) guidelines for anesthesiology, incorporates the concepts espoused in the SAMBA guidelines, but with some differences in delineation. In accordance with the mandate of the US Accreditation Council for Continuing Graduate Medical Education (ACGME) 1996 Residency Review Committee, the core curriculum (CA 1–2 years) in Ambulatory Anesthesia must include resident experience in preoperative evaluation and management

of surgical patients, with the level of complexity commensurate with experience. The RRC guidelines specifies that the ambulatory anesthesia rotation should be a minimum of 1 month with resident management of a minimum of 100 ambulatory surgery cases. Additional requirements include didactic and clinical experience in the management of geriatric patients, regional anesthesia (50 epidurals, 50 spinals, 40 peripheral nerve blocks), and postoperative care unit (PACU) management (e.g. acute pain, PONV, PCA) (Table 1).

The advanced curriculum (CA-3 year), provides for a 6–12 month rotation with emphasis on the integration of clinical, administrative, and research experiences. This period is marked by more complex anesthesia assignments. As the ACGME does not specify further details, programs have developed their own detailed advanced curriculum. Described below is this author's formal program. In addition to the above requirements, CA-3 residents participate in case conferences, journal club, and ambulatory anesthesia-related text book readings. With the medical director as mentor, the CA-3 resident gains administrative experience through ASU/PACU management, participation in interdepartmental activities, budget planning and continued quality improvement-related issues. Research experience is fostered through resident participation in research development and methodology, development of grant proposals for external funding, abstract presentation of clinical study at national meeting(s) of scientific organizations (e.g. SAMBA, American Society of Anesthesiol-

Table 1
US Accreditation Council on graduate medical education requirements

Preoperative evaluation and management of surgical patients
Delineated experience for ambulatory surgical patients for a minimum of 1 month
Management of a minimum of 100 patients undergoing ambulatory surgery
Epidurals (50), spinals (50), peripheral nerve blocks (40)
Acute postoperative pain, PCA, neuraxial blocks
Instruction and experience in managing geriatric patients
PACU management

ogy (ASA), International Anesthesia Research Society (IARS), Post Graduate Assembly (PGA) and/or submission to peer-reviewed journals (*Anesthesia and Analgesia*, *Journal of Ambulatory Surgery*).

The fellowship program (CA-4) provides for a funded 1 year post graduate specialty in ambulatory anesthesia with specific emphasis on research, grant development, administrative, and management skills. The anesthesia fellow spends approximately 50% of the time engaged in research, honing skills in research methodology, grant proposal developments, and presentation/publications of clinical research study. The fellow would expand administrative and management skills by assuming an active role in interdepartmental activities and budget. The CA-4 is also encouraged to attend formal graduate course work in health care finance and administration.

Why should anyone do an ambulatory anesthesiology fellowship? The advanced training provides residents with the opportunity to go beyond the junior curriculum requirements. Additionally, the fellowship program provides the new practitioner with the opportunity to acquire a more comprehensive and integrated knowledge base related to administrative health care finance and business management, an option that is not available during standard anesthesia residency training. The advanced specialty training prepares the resident to assume the role of future medical director, administrator or physician executive. Ambulatory surgery comprises over 60% of practice, and the field continues to expand. If for no other reason, it behooves the future anesthesia provider to enter the work-force armed with, at minimum, a proficiency in ambulatory anesthesia. Currently, there are 150 accredited postgraduate programs: 40 offer specific advanced residency (third year), and 14 offer fellowship training (CA 4–5 years) [4].

For the practicing anesthesiologist, journal reviews, (*Anesthesia and Analgesia*, *Journal of Ambulatory Surgery*), participation in scientific organizations (ASA, IARS, SAMBA, PGA), are ways of meeting continuing education goals (Table 2). The Accreditation Council for Continuing Medical Education (ACCME) sponsors self-study courses available through scientific publications (ASA self-evaluation studies, *Anesthesiology*). In this era of cutting-edge technology, the linkage of computers via the Internet, provides global communication where anesthesiologists may exchange information and educate other medical services as well as the general public almost simultaneously.

Table 2
Ambulatory anesthesia education

Specialty training
Medical school and anesthesiology residency
SAMBA educational guidelines
Residency review commission
Continuing medical education
Scientific publications
Anesthesia and Analgesia
Journal of Ambulatory Surgery
Ambulatory anesthesia textbooks
Scientific organizations
American Society of Anesthesiologists (ASA)
Society of Ambulatory Anesthesia (SAMBA)
Scientific research
Sources: NIH, corporate industry, medical societies

Ambulatory anesthesia is not practiced in a vacuum, but is an integral part of a system working together toward the common goal of providing safe delivery of quality medical care to the community. Therefore, it is imperative that education in ambulatory anesthesia involve not only members of the specialty, but other physicians, nurses, and non-medical personnel as well. Interdisciplinary and continued medical education may be fostered through subspecialty and multidisciplinary conferences, journal reviews, mortality and morbidity conferences, and research seminars.

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US ambulatory surgery projections are inappropriate

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Abstract

Ambulatory surgery in the US, already more than 60% of elective surgery, is predicted to exceed 70% by the millennium. This will be achieved by the increasing use of minimally invasive surgery (MIS) and by including operations and patients currently considered unsuitable for ambulatory surgery. Safety, quality of care and acceptability to patients and their carers from these projections have generally seemed to take lower priority than cost cutting, driven by medical insurance companies and Health Maintenance Organisations. To satisfy even nominally the concept of same day surgery, much of this projected increase appears to depend on a variety of different recovery facilities, including prolonged care by relatives, home visiting by agency nurses, 23 h stays and free standing recovery units for up to 48 h. This may not be a cost effective or appropriate model for other countries with different systems of health care funding. There are signs that in the US, this push to ambulatory surgery beyond reasonable limits is being questioned. Ambulatory surgery has enormous benefits for patients and enables the provision of more cost effective health care but future developments must be carefully monitored to ensure that this remains true. A clearer definition of what is meant by 'ambulatory surgery' is needed, as well as a consensus on the reasons why we keep patients in hospital and on what constitutes acceptable and safe care. © 1997 Elsevier Science B.V.

Keywords: Ambulatory surgery; Minimally invasive surgery; Home visiting; Same day surgery

1. Introduction

The United States of America (US) has set the pace in ambulatory surgery for nearly 30 years, and performs more ambulatory surgery than any other country in the world. The rest of the world generally follows and finds itself doing tomorrow what the US does today. An estimated 66% of all elective surgery in the US is already ambulatory [1], and this is forecast to increase further. Is this an appropriate model for the rest of the world or have the Americans now begun to push the limits of ambulatory surgery too far?

In his latest text book, Paul White summarises the projections for the future of ambulatory surgery in the US [2]. By the millennium it is predicted that more than 70% of elective surgery will be ambulatory. This will be achieved by a move to more minimally invasive

surgery, by carrying out operations which are currently considered unsuitable, and by including more elderly and high risk patients. Day surgery up to now has an extremely good record for safety [3] and patient acceptance. These projections raise questions about what limits should be placed on ambulatory day surgery, and just how far is too far to maintain patient safety and quality of care?

2. Minimally invasive surgery

Minimally invasive surgery (MIS), mainly via the laparoscope, has significantly improved recovery after many procedures previously associated with considerable morbidity and the need for hospital stay. The increasing use of MIS may therefore enable more ambulatory surgery. However, MIS is not free from post-operative morbidity, and it can be extremely difficult to get patients home quickly after more invasive laparoscopic procedures. Studies of laparoscopic cholecystec-

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tomy, for instance, report prolonged recovery time and increased rates of overnight admission, with the majority of patients requiring at least 23 h recovery [4–6].

Microdiscectomy, a minimally invasive approach instead of a more major operation for prolapsed intervertebral disc, was carried out on carefully selected patients on a day case basis in one centre [7]. It was reported to be acceptable to 85% of patients, despite 24% describing their ambulance journey home as very uncomfortable. A relative was needed to care for the patient at home for 5 days postoperatively, and 18% felt that this was too onerous. The general practitioner (GP) was called out by 20% in the first 5 days and 3% were readmitted.

This suggests that early discharge after some MIS simply passes costs and the burden of care to the family and community health services. A one night stay after more major MIS may be a more appropriate and realistic goal.

3. Shifting more major procedures to the ambulatory setting

A disturbing trend is the move to do on an ambulatory basis, procedures which are generally acknowledged to be major operations, and which have traditionally needed not just a one night stay, but several days. There have been reports of day case vaginal hysterectomy [8,9], some laparoscopically assisted, although this may increase rather than decrease complications. Patients were sent home 7–10 h after their surgery. They needed to be well motivated, with good home circumstances and a carer for 48–72 h. Their discharge analgesia was acetaminophen and oxycodone or fentanyl patches. They removed their own urinary catheters if these were used, and took their own temperatures. They were contacted by the attending physician on the evening of their surgery and the following 2 days, and visited by a home health agency nurse. In Summitt et al.'s [9] retrospective study of 133 ambulatory vaginal hysterectomies, the overnight unplanned admission rate was 9%, and 3.8% were readmitted.

Vaginal hysterectomy is a painful operation, and there is an incidence of serious postoperative complications. After an 8 h postoperative stay, these patients must have been sent home fairly late in the day with what seems minimal analgesia. An occasional phone call or visit by an agency nurse does not appear to guarantee quality of care, nor is it an option in many other countries, where community resources are more limited. Discussion of vaginal hysterectomy on an outpatient basis [9,10] appears to be centred on the surgical aspects and cost savings rather than patient safety and quality of postoperative care.

A more amazing suggestion by Palmer et al. is that radical retropubic prostatectomy should be an ambulatory procedure [11]. The estimated blood loss in this study was 1200 ± 527 ml, and 59% of the patients required blood transfusion. After surgery under epidural bupivacaine, one dose of epidural morphine was given for postoperative pain relief. Many surgeons and anaesthetists would be very uneasy about discharging such patients the same day. However, the length of stay in Palmer's study was 1.7 ± 0.6 days. A total of 37% were discharged home after a one night stay, and the rest stayed longer. It is difficult to see how this fulfils the criterion of same day surgery.

Other suggestions for more major ambulatory procedures have included mastectomy, thyroidectomy, and knee and shoulder reconstructions.

4. Older and less fit patients

The current trend is to include more elderly and less fit patients in selection criteria for suitability for day surgery. There is little, if any, evidence that age or stable systemic disease contributes to increased morbidity, but the combination of more invasive surgery with age and infirmity may do so in future.

5. What happens after discharge?

What do these patients look and feel like when they go home? In the early days of ambulatory surgery, it was generally reckoned that patients needed to be 'street fit' to be able to go home. This has been replaced by the term 'home readiness'—an insidious change of emphasis—where the patient is expected to go home and stay in bed, with more care provided by their family. Patient education is stressed, to make sure that the patient knows what to expect and, the cynic might suggest, does not bother the ambulatory facility for trivial matters like pain or bleeding.

6. Ambulatory or same day surgery?

The push for more ambulatory surgery is, of course, dollar driven. The Medical Insurance Companies' and Health Maintenance Organizations' reimbursement to health care facilities is based on procedures being scheduled as ambulatory and as if recovery is predicted to be uneventful. Overnight admission is charged as unplanned hospitalization [12]. This means that the definition of ambulatory surgery is often not what is generally understood by this term in other countries and may include the 23 h overnight stay, in order to satisfy, even nominally, the expectation that unplanned

admission rates will not exceed 1 or 2% after 'same day' surgery.

To the rest of the world, ambulatory surgery is day surgery and is defined as a patient who has surgery, and goes home to his or her own bed the same day. In the UK, if a patient spends the night in hospital, they cannot be recorded as a day case. Hospital stays in all Western countries have fallen over the last 2 decades. In the UK, for example, bed occupancy per bed per annum has increased 50% and the number of acute inpatient beds has fallen by 20% since 1985 [13]. To the rest of the world, the 23 h stay regarded in the US as ambulatory surgery is short stay surgery.

The 23 h stay appears to be an artificial concept of same day surgery designed to ensure short hospital stays for the benefit of insurance companies. However, the cost benefits of true 'day' surgery are due to the ability to reduce hospital beds and expensive out of hours nursing costs. If the patient stays overnight because more prolonged recovery is needed, more facilities are needed than the average day surgery unit provides, and overnight nursing care is still needed. Does the 23 h stay actually save any money compared to short stay surgery?

If the object of increasing ambulatory surgery is to cut costs, it is clearly not successful in the US, as health spending (\$ per person at purchasing power parity) is 75% higher in the US compared to Canada, and double that of European countries [14].

7. Other post operative recovery facilities

The types of care that American patients receive after their ambulatory surgery have been summarised by Twersky [15]. Many patients go home to be looked after by a carer, but other options are a visiting nurse, often agency rather than hospital based, a hospital hotel for self caring patients who live alone, hospital integrated recovery facilities or free standing recovery units for up to 48 h. Patients may need to be transported to these recovery units by ambulance, accompanied by paramedics.

This may not be appropriate for the rest of the world. Agency home nurses would not be cheap or easily available in many other countries, and passing the care for those patients who still need considerable medical and nursing input to the community health services, i.e. GPs and practice nurses, would be unpopular in publicly funded health systems unless special financial arrangements were made to reimburse the costs. In the UK many family doctors in charge of their own budgets purchase surgery directly for their own patients. Day surgery may be a less attractive option if increasingly complex ambulatory surgery means that their already heavy out of hours work load is further increased [16] without remuneration.

Privately financed free standing recovery facilities would be unlikely to be cost effective in other countries. From reports from the US, this appears to lead to the creation of additional small boutique type recovery units. It is clear from the public press and medical literature that health is big business in the US, and makes large profits for those who run health facilities, encouraging a proliferation of these. The attempt in the UK to defray the costs of health care by the Private Finance Initiative (PFI) is now acknowledged to have failed [17], and to undermine rational planning of health care. Health care provision is expensive and returns on private investments need to reflect the high capital input and risk involved. Furthermore, planning assumptions by commercial organisations may not accurately reflect clinical need [18].

If all health care in a country is publicly funded, a plethora of different recovery facilities would result in increased capital costs, duplication, and perhaps poor occupancy rates. This would neither save money nor improve quality of care. Economies of scale should make comparable care in hospital cheaper, provided that charges reflect actual costs.

In less well developed countries with long distances to hospital, few community services and low levels of funding, either private or public, these models of post-operative care would be unrealistic.

8. Patient attitudes

Although, in general, patient attitudes in the US to ambulatory surgery are described as favourable, this may be influenced by the financial penalties incurred if the procedure is not scheduled as ambulatory. Different systems of health care may have different political priorities and accord different values to patient opinions compared to the US, depending on what resources are available and who pays the bill in the end.

All studies of more controversial ambulatory surgery stress careful patient selection and education, and the resulting increased medical attention may incur a gratitude response on the part of the patient that may not accurately reflect patient opinions if the procedure is extended to a wider population of patients and day surgery centres.

9. How far is too far?

There are signs that even in the US this push to ambulatory surgery beyond reasonable limits is now being questioned. At the Ambulatory Anesthesia Symposium in Sydney, Australia in 1996, many American anesthesiologists stated that they were unhappy with the direction they were going in, but that they were

powerless in the face of the insurance companies. Paul White [2] comments that: "In shifting more extensive procedures such as shoulder and knee reconstructions and vaginal hysterectomy ... to the ambulatory setting, careful cost benefit analyses should be performed to avoid going too far." In New York, legislation is being drafted to outlaw 'drive through' mastectomies, and force insurers to pay for at least 48 h of hospital care [19].

Quality of care is not an absolute term—it needs to be defined in the context of the physical and financial resources, geography and patient expectations of the community served. What is appropriate in the US may not be appropriate in differently funded health systems, or for developing countries with fewer resources.

Ambulatory surgery has enormous benefits for patients and enables the provision of more cost effective health care but these future developments must be carefully monitored to ensure that this remains true. A clearer definition of the term 'ambulatory surgery' is needed, as well as some consensus on the reasons why we keep patients in hospital, and on what constitutes acceptable and safe care.

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Can laparoscopic cholecystectomy be a same-day procedure?¹

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Abstract

Gall bladder surgery by video-laparoscopy (VL) can now successfully fulfill the same goals as traditional surgery and is associated with comparable, if not better, results both in terms of positive surgical outcome and patient satisfaction. With public health spending under growing social and administrative pressures, and continuous efforts being focused on enhancing the efficiency of both surgical instruments and operating procedures, it is a most attractive, albeit initially challenging, prospect to regard video-laparoscopic surgery as day-care surgery. In the period January 1994 to December 1996, 1334 patients underwent VL cholecystectomy (898 were women and 436 men). A total of 1034 laparoscopies used gas and 300 were gas-less. Of the 1334 patients, 72 (5.4%) were treated on an outpatient basis. The authors assess this option, in light of recent technical developments and of the relevant major organisational and professional implications, and consider the feasibility of a day-care surgery project which might be implemented. © 1997 Elsevier Science B.V.

Keywords: Day case; Laparoscopic cholecystectomy

1. Introduction

Historically, surgeons have classed day case procedures as minor surgery. In recent years, an increasing number of surgeons have focused their attention on the new notion of 'major day case surgery', which involves greater commitment, and an in-depth understanding of the relevant clinical, surgical and organisational aspects. This has occurred because surgeons have been forced to modify their attitude and behaviour for reasons that are both scientific and financial.

There is no doubt that this type of surgery demands a great deal of experience as well as adequate technical skills. Video-laparoscopic (VL) surgery also requires the surgeon to acquire an in-depth understanding of the specific instruments, and to develop very keen eyesight.

These fundamental objectives must necessarily be fulfilled if the surgeon is to avert risks and complications which may, at times, be very serious.

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The financial pressures that have driven the demand for new treatment approaches and clinical evaluation methods are essentially the following: in-patient beds are being eliminated in many wards, and consequently it is difficult for patients to be hospitalised for anything less critical than cancer or acute emergencies, therefore ward waiting lists are growing steadily; hospital administrators are keen to cut spending as a result of the skyrocketing costs associated with hospital care; and payments now tend to be made in respect of individual treatments, rather than ward stays. Hence the need to carefully review which operations are best suited to day-surgery.

Same-day surgery should ideally be adopted when the procedures are of minimal to moderate difficulty, the duration of the procedure is limited and the incidence of serious complications decisively low. Furthermore, the post-operative period should be virtually pain-free for the patient.

The onset of interventional radiology, surgical endoscopy, hernia repair and minimally invasive vein surgery, in addition to the latest anaesthetic techniques, have greatly increased the indications for day-care surgery. It must be emphasised, however, that none of these procedures involves opening the peritoneal cavity.

Since the dawning of the laparoscopic era in the 1960s, research has permitted awesome progress to be made, and with video technology dramatically enhancing the surgeon's view of the surgical field, diagnostic and surgical indications that seemed farfetched even a few years ago have now become routine.

As far as VL cholecystectomy is concerned, it is quite feasible that the development of so-called 'pharmacological' treatments for gallstones may have discouraged some surgeons from endeavouring to improve their operating technique. Later disappointments surrounding attempts to dissolve or shatter stones have led to cholecystectomy being appreciated as the definitive gallstone procedure, driving research efforts toward minimising problems associated with scarring, post-operative paralytic ileus, and pain, and thus shortening the duration of ward care.

Cholecystectomy is one of the most common procedures performed in Italian hospitals. In the US an estimated 500 000 operations are carried out every year, with a mean ward stay until a few years ago, of 3–5 days. With the advent of minimally invasive laparoscopic cholecystectomy many patients are out of bed hours after surgery. Post-operative pain is minimal; scarring at the stab wound site is as a rule only mildly tender; abdominal discomfort is generally restricted to the first 24 h post-operatively; occasionally there may be some tenderness in the scapular region associated with pneumoperitoneum, which however subsides very quickly. Painful meteorism is avoided thanks to the absence of paralytic ileus and the almost immediate return to normality of the digestive system, so that the patient can take oral fluids within hours of surgery, and the diet can virtually return to normal on the following day. There is a rapid return to work and to a normal social life, with obvious benefits for the patient, the family and society as a whole [1–11].

Therefore it is quite reasonable to assume that using this technique which minimises patient discomfort and adverse post-operative effects cholecystectomy might be considered feasible as a day case.

2. Materials and methods

We retrospectively assessed the case studies of three surgical centres located in Lombardy: the Institute of General and Thoracic Surgery of the Ospedale Maggiore Policlinico in Milan; the General and Minimally Invasive Surgery Department of the Policlinico San Marco in Zingonia-Osio Sotto (Bergamo); and the General Surgery Division (7th floor) of the Ospedale San Carlo in Milan.

In the period January 1994 to December 1996, 1,334 patients underwent VL cholecystectomies (898 were women and 436 men). Of these 1034 laparoscopies used gas and 300 were gas-less.

The average age of the patients was 51 years (range 11–87). Of the total number of patients 1177 (88.2%) presented with simple gallstones (including 60 with associated conditions), 78 (5.9%) presented with acute cholecystitis (two with associated conditions), 59 (4.4%) with chronic cholecystitis (one also had a leiomyosarcoma of the small intestine) and 20 patients (1.5%) had other assorted diseases.

Of 1334 patients 896 (67.2%) belonged to ASA class I, 387 (29%) to ASA class II, and 51 (3.8%) to ASA class III.

All the VL cholecystectomies using gas were carried out under general anaesthesia, while 15 of the 300 gas-less procedures were carried out under epidural anaesthesia following injection of an anaesthetic mixture at the level of L2-L3/L3-L4/L4-L5. Of these 15 cases, 11 were classed as ASA I, three were ASA II and one was ASA III; the anaesthetic assessment contra-indicated general anaesthesia due to the presence of associated diseases such as BPCO, hypertension, diabetes mellitus and dilated congestive cardiomyopathy.

The average hospital stay for all patients was 3 days (range: 24 h–5 days). Of the patients who had the conventional procedure using gas, 12 (1.2%) were discharged within 1 day of surgery, 14 (1.4%) within 2 days, 687 (66.5%) within 3 days, 213 (20.6%) within 4 days and 107 (10.3%) within 5 days.

As regards the patients who were subjected to a gas-less cholecystectomy procedure, the average ward stay was 24 h for 60 patients (20%), 2 days for 180 (60%) and 4 days for 60 patients (20%).

Out of the total 1334 patients who underwent VL cholecystectomy with or without gas, 72 patients (5.4%) were treated on an outpatient basis.

Eighty percent of the patients discharged beyond day 4 post-operatively were kept on the ward for primarily logistic reasons: e.g. they lived too far away from the hospital, or were living alone; in some cases there was a suspicion that adequate care might not be provided by family members; and several patients were elderly and not satisfactorily cooperative.

The naso-gastric tube was removed from 1248 patients (93.6%) within the first 24 h; it was removed immediately upon leaving the operating theatre in 998 patients (80%), about 5 h following surgery in a further 150 (12%), and over 6 h later in the remaining 100 (8%).

Of the total 1334 patients 1170 (87.7%) were able to take oral fluids within the first 24 h, 1110 (94.9%) only 4 h after the operation, 42 (3.6%) after 6 h and 18 (1.5%) after 8 h.

Normal bowel movements resumed on the first day in 1213 patients (90.3%).

Of the patients who underwent the VL cholecystectomy using gas, only three (0.3%) required a bladder drain, which was removed during the first day. All 300

patients who had the gas-less procedure were routinely fitted with a catheter, which was removed within the first 24 h. Episodes of urinary retention occurred in only three (0.2%) of the total 1334 patients.

The presence of low-grade benign prostatic hypertrophy is not a contraindication to a same-day procedure. In our series, we encountered 10 cases of known BPH, of which seven were stage 1 and 2, and three were above stage 3. Of the BPH stage 1 and 2 patients, none developed urinary retention, while all three patients with grade 3 or above disease did develop one episode of urinary retention. Of the total number of patients 923 (89.3%) treated laparoscopically with gas and 291 (97%) of those given the gas-less procedure—totalling 1214 (91%)—were back on their feet within 24 h. Ninety five percent of these were walking normally within 3 h of surgery.

Revision surgery was required for only one patient (0.1%) out of the 1334 cases treated. This patient was returned to the operating theatre on day 2, following the formation of a sub-hepatic haematoma.

Drains were placed in 319 (23.9) patients, of whom 19 (1.8%) had the conventional cholecystectomy procedure using gas. This latter group included two patients (0.2%) with acute cholecystitis, five (0.4%) with chronic cholecystitis, 11 (0.8%) patients with gallstones associated with cirrhosis of the liver, and one (0.1%) with choledochocholelithiasis.

Generally speaking, the patients with uncomplicated gallstones treated laparoscopically with gas insufflation never required a drain, which was positioned only in patients at increased haemo-coagulative risk. This approach was possible thanks to the characteristic laparoscopic view of the surgical field, which is highly magnified and therefore affords very accurate haemostasis.

In the group treated with the gas-less procedure, the drain was positioned routinely regardless of specific patient conditions. However, the drain was removed within 24 h in 99% of the patients.

Intra-operative complications appeared in 0.3% of the patients, but were never serious enough to warrant conversion to an open procedure.

Eleven patients (0.9%) developed post-operative complications: two pseudo-obstructions on day 3; one case of persistent post-operative pain on day 1; one Transient Ischemic Attack on day 1; two cases of vomiting that did not respond adequately to anti-nausea treatment; two cases of arrhythmia: one atrial fibrillation and one tachyarrhythmia on day 5, both controlled by specific therapy; one admission to intensive care due to the onset of pulmonary oedema on day 3; one case of haematoma in the vicinity of the umbilical stab wound; and one case of slight biliary leakage (at the drainage site) which did not require the procedure to be repeated.

3. Discussion

Since 1987, laparoscopic cholecystectomy has virtually replaced open cholecystectomy for the treatment of gallstones [21]. This is due to the excellent view that the surgeon has of the surgical field, combined with the negligible discomfort experienced by the patient. Keimbeck carried out a study on 19 patients who underwent laparoscopic cholecystectomy, and none of them reported nausea or vomiting or required medication of any kind. The patients were allowed to go home on the same day as the procedure, and were checked on every 6 h. All stated that they resumed eating light meals about 6 h after surgery, and at the 1 week follow-up, 18 (94.7%) reported that they went back to work after 2 days [12].

Several authors have stressed that patients operated on laparoscopically require less analgesics than those submitted to the open procedure [13–15].

Delaunay evaluated nine ASA class 1 patients who underwent laparoscopic cholecystectomy. They were seen on the same day as the operation, on day 3 and again on day 10 post-operatively. The author checked patient discomfort, heart rate, arterial pO_2 , O_2 and CO_2 consumption, and observed that the post-operative values were not significantly different to the pre-operative values. This confirms diminished muscular and cardio-respiratory impairment after laparoscopic cholecystectomy [16].

In economic terms, Fullarton observed that out of 100 laparoscopic cholecystectomies carried out between 1990 and 1992, the costs associated with the first 50 cases were only slightly lower than the cost of open cholecystectomy. In the next 50 cases, the difference was more markedly in favour of the laparoscopic procedure. Obviously the experience of the surgeon contributes not only to improving the technical outcome, but to better controlling complications and post-operative sequelae, which are the principal causes of longer hospital stays and higher costs [17].

In a study involving 55 surgeons who had performed 8839 laparoscopic cholecystectomies between 1989 and 1993, Moore stressed that, depending on the surgeon's technical skill, the likelihood of causing a VBP lesion in the course of the surgeon's first case was 1.7%, but dropped to only 0.17% during the 50th case [18].

The parameter measured by Peters was the average duration of the procedure. He reported that over a period of 6 months, after 100 VL cholecystectomies, this parameter dropped from $122 + 45.4$ to $78.5 + 30$ min [19].

Traverso estimated that 60% of the costs associated with a VL cholecystectomy pertain to the operating theatre: i.e. the use and maintenance of the surgical instruments account for 17% of the costs for the entire in-patient stay, and 28% of the costs pertaining to

theatre maintenance. Operating theatre personnel account for 24% of the total cost of the patient's hospital stay, and 41% of operating theatre costs. Accordingly, in order to contain the cost of the operation, surgeons should try to shorten the duration of the procedure, a factor depending largely on their experience and technical competence [20].

As already underlined, the average hospital stay of a patient undergoing a VL cholecystectomy in most centres, is 2–3 days [21]. However, in view of the low postoperative complication rate and the speed of recovery (immediate removal of the nasogastric tube, absence or early removal of urinary catheter, absence or early removal of drain, absence of significant pain, nausea and vomiting, early mobility, early normalisation of bowel movements and fast return to a normal diet), some centres have proposed performing laparoscopic cholecystectomy as a day-surgery procedure [22].

The greatest hurdles in successfully managing laparoscopic cholecystectomy as a day-surgery procedure are on the one hand represented by the patient's diffidence—many patients fear that they will be given inadequate post-operative care—on the other hand, some surgeons feel that since the procedure is intra-abdominal, albeit far less traumatic than the traditional technique, better direct post-operative care is needed than a same-day procedure can afford.

Already in 1989, several Anglo-Saxon authors spoke in favour of same-day patient discharges and soon thereafter began reporting their results. Between 1989 and 1991, Arregui performed 622 VL cholecystectomies, 106 of which were on a day-surgery basis. None of the patients required post-operative admission, and only one patient was sent home with medication to counteract vomiting [23].

Various authors have proven the feasibility of carrying out the procedure and managing it post-operatively on a day-surgery basis, including Prasad and Foley, who studied 103 patients undergoing VL cholecystectomy. Of the total 103 patients 42 were selected to have the operation as a day case. The patients were under 60 years of age, belonged to ASA class I or II, had explicitly asked for the procedure to be carried out on an outpatient basis, had no history of jaundice or drug intolerance and lived close to the hospital. The average duration of the anaesthesia was 70 min (ranging from 60 to 95 min), and the average duration of the procedure was 43 min (range: 20–65 min). At the end of the operation, after spending 2–3 h under observation on the ward, the patients were invited to mobilise, take oral fluids and pass urine. At the conclusion of the observation period, it was decided whether the patient could be discharged. The authors reported no significant post-operative complications in the group [24].

What pre-, intra- and post-operative parameters can be used to guarantee that discharging the patient is

'safe', and what compulsory procedures must be implemented and subsequently evaluated for this purpose?

The pre-operative evaluation is a critical step toward ensuring a correct indication and avoiding disagreeable surprises (ASA class, associated illnesses, clinical history, location of patient's home, psychological status, physical conditions, physical examination).

The patients booked in for a cholecystectomy on a day-surgery basis must necessarily be studied with the utmost attention. They should be put on a separate waiting list than the normal ward list, to facilitate an accurate pre-operative work-up.

The patients should begin with a day-hospital schedule including all the various routine pre-operative blood chemistry and instrumental examinations, with special attention being focused on the cardio-vascular system. The purpose of the work-up is to rule out any conditions, pathological or not, which may contraindicate the day-surgery procedure. The inclusion criteria shown in Table 1, are namely: patient motivation; age < 70 years; ASA class I or II; body mass index < 35; clinical history of biliary colic; absence of anxiety; no history of jaundice; no suspected bile duct stones; total anaesthesia not contraindicated; and the assurance of someone at home prepared to provide help, if necessary.

Any associated medical disorders need to be carefully evaluated. Jaundice or a suspicion of stones in the main bile duct should be ruled out by endoscopic retrograde cholangiopancreatography (ERCP) followed, if necessary, by papillotomy to remove the stones, or, alternatively, an interoperative cholangiography can be performed during the laparoscopic procedure, followed by choledochoscopy and removal of the stones through the cystic duct.

During the pre-operative examination, the patient must always be informed of the possibility that the laparoscopic procedure might need to be converted to an open procedure (the conversion rate reported in the literature is around 3.7%).

Table 1
Inclusion criteria

Outpatients	Inpatients
Age < 70 years	Age < 70 years
ASA I, II	ASA III, IV
Body mass index < 35	Body mass index > 35
Biliary colic	Acute or chronic cholecystitis
No history of jaundice	Clinical history of jaundice
No suspected main bile duct calculi	Anxious personality
Motivated	Previous attempts at day-surgery failed
	Living alone
	Home far from hospital or without telephone

The operation must be carried out in a suitable environment and operating theatre. The surgical and anaesthetic team must be well qualified to perform this type of procedure and, above all, trained to follow up the patient after being discharged and sent home. The patient may be given mild premedication, in the literature, several authors claim that none is necessary; I.V. and I.M. antiemetics and pain medication should be available during the post-operative period.

The intra-operative evaluation focuses on how easily the procedure is performed, and whether there is any suspicion of immediate complications such as vascular, biliary or visceral lesions. Further parameters include the normal induction of and awakening from anaesthesia, together with the total absence of suspected complications associated with pneumoperitoneum. At the conclusion of the procedure, great attention must be devoted to eliminating virtually all the gas insufflated into the abdomen, so as to reduce the risk discomfort due to scapular pain [25].

The post-operative evaluation must make reference to the rapid removal of the nasogastric tube; the patient's ability to take oral fluids without nausea and/or vomiting; removal of the bladder catheter, if used; rapid recovery of normal diuresis; early mobility and when used early removal of the drain. Furthermore, the patient must feel little pain, be able to walk unaided and be alert and conscious.

It is essential for all vital signs to be within the normal range. The decision to discharge the patient must be taken jointly by the surgeon and the anaesthetist. On discharge, patients are given only oral analgesics, and are accompanied home. Within 24–48 h the surgeon checks up on them by telephone.

Our experience with 1334 consecutive cases confirm the findings reported in the literature. When well defined protocols and indications are complied with the patients make a speedy and uneventful recovery and the rate of clinically significant complications is relatively low. In our series, the total incidence of conversions, repeat procedures and intra- and post-operative complications warranting admission to an in-patient ward, amounted to 1.8%.

Of the total number of patients 93.5% reported normal gastro-intestinal functions within 24 h; 90.2% of the patients were able to take oral fluids on the same day as the operation and had bowel movements within the first day post-operatively.

Recovery of diuresis was rapid and no bladder catheter was required in most of the cases where gas was used (99.7%); in the rest, the catheter was removed in 93.6% of cases within the first 24 h, and only 0.3% of the patients reported episodes of urinary retention.

Obesity was not found to be an absolute contraindication to day-surgery. In our series we treated nine obese patients and none presented unusual post-operative sequelae compared to the non-obese patients.

Even patients of advanced years (i.e. aged over 65–70) can be treated on an out-patient basis. Of course their general health must be good and there must be a low anaesthetic risk. In such cases the use of selective spinal anaesthesia—which we opted for in the gas-less procedures—proved beneficial and effective.

No post-operative infections were reported.

The literature mentions the unfavourable effects of pneumoperitoneum on cardiorespiratory functions and the acid-base balance in patients with cardiac or bronchopulmonary disorders [26,27]. In our series of procedures using gas, we noted the appearance of arrhythmia or metabolic acidosis in only 0.2%. Of course, it was intended that gas-less laparoscopy and epidural anaesthesia should exclude the risk of complications associated with pneumoperitoneum, in cases considered to be at risk from this procedure.

We observed post-operative complications serious enough to advise against a rapid discharge in less than 1% of the cases that underwent conventional laparoscopy, and 0.2% of the cases treated with the gas-less procedure [28–31].

4. Conclusion

Most American and Anglo-Saxon, and now even European centres are well equipped to treat uncomplicated gallstones in a day-surgery environment. The studies published in the literature justify and confirm the feasibility of the procedure.

Several reports in the literature, already mentioned in this paper, have presented encouraging results in terms of the parameters for carrying out VL cholecystectomy in total safety and the subsequent protected discharge of the patients. In selected case studies, the authors report very accurate data on the removal of the nasogastric tube and bladder catheter, and the time it took patients to resume oral fluids and normal diuresis; conversely, there are no convincing protocols or indications regarding the placement and removal of drains. This aspect is probably more strongly influenced than other parameters by the experience and individual preferences of the surgeon.

Based on experience acquired both in the principal European and American centres and in our own hospitals, we may safely conclude that when correct protocols and indications are followed, VL cholecystectomy with or without gas can definitely be carried out as a day case procedure, in patients selected on the basis of an accurate preoperative evaluation, a successful intra-operative assessment and an uneventful immediate post-operative period. However, the procedure can only be performed in centres featuring a strong positive attitude towards 'day-surgery'. Staff must be suitably trained for shorter, but closer patient contact, schedules

must be well-planned, follow up at the patient's home must be carried out routinely, and it must be possible (i.e. both administratively and in terms of personnel availability) and feasible to re-admit patients to the ward if required. These are just a few of the factors on which the success of such a project depends.

Nor should we forget the mentality and sensitivity of the patient, who must not be distressed by behaviour that could conceivably be interpreted as indifferent or negligent, for this might result in dire medico-legal consequences.

Lastly, the medico-legal aspect itself. Clear communications with the patients and their family members, an accurate informed consent questionnaire, an efficient technical and organisational approach are naturally indispensable. However, the law, the judges and the medico-legal experts must also learn to reconcile entrenched beliefs and procedures with the evolution of scientific knowledge, so that from their point of view, laparoscopic procedures such as day-surgery VL cholecystectomy, can be and are legally safeguarded.

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