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Editorial

Procedure selection guidelines: the time is now to prepare for the 21st century

With the development of rapid emergence anesthetics, with new surgical techniques and technology, ambulatory surgical procedures have moved far beyond selection guidelines of the early 1970's. Restriction on length of procedure or the need to be minimally invasive appear to have evaporated.

Who could have imagined that in the 1990's ambulatory facilities would be performing laparoscopic cholecystectomies and hysterectomies; lumbar and cervical microdiskectomies; anterior cruciate ligament repairs and shoulder stabilizations. What doors will be opened by the use of Magnetic Resonance Imaging operating rooms? Who among us is visionary enough to predict technologies that will be available and types of ambulatory procedures that will be performed in the next century?

Typically, each year ambulatory surgical procedure lists expand as we continue to discover we have not yet reached beyond the boundaries of acceptability; boundaries for which guidelines have not been established. Facilities must develop and adapt their own selection process to the continually evolving ambulatory surgery setting. Decisions must be based not only upon physical status of the patient or invasiveness of the surgical procedure, but must also take into consideration where the procedure will be performed: an ambulatory setting within the hospital; a freestanding facility that could be a distance from the hospital; a totally separated and possibly even isolated physician's office surgery setting. Regardless of the type of ambulatory facility, the underlying goal must be to maintain quality and safety. Past accomplishments must not lull us into a state of complacency.

Acceptable procedures for a given ambulatory facility should be established by an evolutionary process. On a periodic basis, the medical director with a committee made up of those physicians who use the facility must decide which procedures and which patients are appropriate for that particular facility, given the availability of equipment, staff and their capabilities, the ability and reliability of a given surgeon, and medical condition of the patient.

Although the length of a surgical procedure is generally not a contraindication; we have availability of short-acting fast emergence anesthetics. Longer procedures and those procedures ending late in the workday may be associated with an increased risk of overnight observation. Not a problem in a hospital ambulatory facility; not a problem in a freestanding facility that has extended recovery care; but a potential problem for a physician's office setting.

Procedures can be performed in an ambulatory setting if it is expected the patient will be sufficiently stable in the post operative period to be managed at home by nonmedical personnel or in time by themselves. Relative contraindications include procedures associated with significant blood loss or large fluid shift, large and difficult wounds at risk for bleeding, infection or other complications, delayed complications such as airway edema, inability to void, or difficulty with oral intake.

As we approach the 21st century, there will be increasing pressure from government, industry and healthcare payors to perform more complex ambulatory surgical procedures, to manage increasing numbers of patients with health problems. We will be continually challenged to merge excellence of care with lowering of cost. Future challenges may be as great, if not greater, than those faced in past years.

Selection criteria today are still being made by blending available information, clinical judgement, and intuition. We must rely upon outcome studies that not only address surgical procedure, patient physical status, anesthetic management, post anesthesia care, rate of unanticipated admission, patient and family satisfaction with the ambulatory surgery experience, but are also site specific. The time is now to prepare for the 21st century.

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Review article

The preoperative assessment clinic: organization and goals

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Abstract

The current challenge of preoperative evaluation is to perform value based, efficient and effective preoperative assessments which result in maximum operating room efficiency. In an era of diminishing health care resources, efficient organization and utilization of those resources available in the preoperative clinic will result in cost savings via reductions in operating room delays and cancellations. Effective organization can also reduce laboratory testing and the use of outside consultation. Fostering a patient-centered focus in the preoperative clinic can reap the additional benefits of increased patient satisfaction and confidence in the hospital and health care providers.

Keywords: Anesthesiologists; Formal system; Preoperative evaluation

1. Introduction

With diminishing economic resources, hospitals are currently challenged to provide efficient, value based preoperative assessment resulting in maximum operating room efficiency. In most cases, managed care and other insurance payers will no longer cover hospital days prior to the day of surgery. As the focus changes from inpatient to outpatient care, preoperative clinics have had to develop schemes of organization capable of providing assessments of large numbers of ill patients for all types of surgery. Efficient preoperative evaluation performed at least several days prior to the planned surgical procedure can have patient benefits as well. If a patient has a complicated medical history and extensive information needs to be collected and assessed prior to surgery, waiting until the night before surgery to perform these assessments may result in delays and cancellations if reports cannot be quickly obtained.

Hospitals that had no formal systems for outpatient preoperative assessment have been forced to develop such systems. Ever increasing financial constraints require that this be accomplished with no resultant operating room cancellations or delays due to inadequate assessments. Cost containment requires maximization of manpower resources while minimizing consultations, testing requirements, and redundant provider interviews. Efficient methods of collecting and recording data are likewise required.

The preoperative evaluation center therefore needs to operate in a manner that is efficient and favorable for patients, surgeons, health insurance organizations, and referring physicians. The preoperative center is basically a clinical unit charged with making the assessment that patients' medical conditions are optimized for upcoming surgical procedures. Because the major role of this center involves clinical decision making, the anesthesiologist should play a key role in the organization and direction of these centers. Specific expertise regarding clinical assessment, appropriateness of preoperative testing, and effective preoperative management should allow the development of integrated and efficient patient evaluations.

Unfortunately, the literature available regarding appropriate evaluation, risk assessment, and outcome does not provide clear guidance. Uniform clinical goals can be established via communication and conferences. Policies and guidelines should be clear, available in written form, and distributed thorughout the depart-

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ment. Alignment of policies and goals is essential so that patients assessed in the preoperative clinic are not delayed or cancelled by another anesthesiologist on the day of operation.

A generational change in mindset of the anesthesiologist is required and is only very slowly occurring. Anesthesiologists are often reluctant to take on clinical roles outside the operating room and may feel uncomfortable in situations involving extensive patient interaction. Until recently, residency programs have been severely lacking in emphasis on the importance of patient assessment skills as well as the importance of administrative and organizational skills, leaving few anesthesiologists with the competence and commitment to take on major roles in this area. Surgeons may not perceive the implications of concurrent medical issues or the importance of obtaining appropriate information and test results from primary care physicians.

The misused and unfortunately perpetuated concept of 'clearance' prior to a surgical procedure needs to be rethought. Many surgeons and anesthesiologists incorrectly feel that 'clearance' of complicated patients who have been followed extensively by primary care physicians or cardiologists outside the hospital can be provided instantly by referring a patient for consultation with an internist or cardiologist at the hospital who knows nothing about the patient and is evaluating them for the first time. This is a misguided concept, as all available appropriate information on the patient needs to be available at the time of the preoperative evaluation. Asking for 'clearance' does not obviate the need to include this information and the input of the patient's primary health care providers in the preoperative assessment. In fact, failure to do so would constitute substandard patient care. Appropriate patient assessment utilizing an organization that provides mechanisms for including all relevant patient data will significantly reduce the need for formal consultation, as described below.

2. Financial issues in the preoperative clinic

In a time of diminishing revenues, hospitals may be reluctant to commit resources to the preoperative clinic. However, maximum operating room utilization and efficient turnover times can only occur if proper patient preparation has been done. In a time when even the most complicated patients coming for major surgical procedures are not admitted prior to the day of surgery, appropriate patient evaluation is essential for the operating room to function smoothly. Any delay, whether due to missing test results, absent surgical consents, or abnormal electrocardiograms that have not been addressed can lead to costly unused operating room time while the issue is resolved or another patient is moved into the now vacant operating room time slot.

The willingness of the hospital and anesthesia departments to commit resources to the pre admitting test center (PATC) has had an extremely positive impact in decreasing the number of consultations and laboratory tests. These decreases in consultation and testing are particularly significant in an era when the percentage of patients in capitated health insurance systems continues to increase. At our institution, appropriate training of the anesthesiologist in preoperative assessment has resulted in a significant decrease in the use of consultation services (Fig. 1). Costly unused operating room time is minimized when effective preoperative evaluation reduces operating room delays and cancellations due to inadequate assessment. The cancellation rate at the Brigham and Women's Hospital due to PATC-related issues is significantly less than 1%. These advantages have also been documented by other institutions. Similarly run interdisciplinary preoperative clinics have reported lower surgical cancellation rates [1–3] and decreased laboratory procedures [1].

The preoperative clinic does provide some opportunity for income generation. Insurance practices particular to area should be investigated, and in many cases billing for preoperative services provided at least 72 h prior to the surgical procedure can generate revenue and offset some of the costs of the clinic. Preoperative services that can be appropriately billed for and corresponding procedure codes can be evaluated through the hospital's finance department.

3. Structural organization of the PATC at Brigham and women's hospital

Currently, about 90% of all patients who undergo surgery in our main operating rooms are first seen in

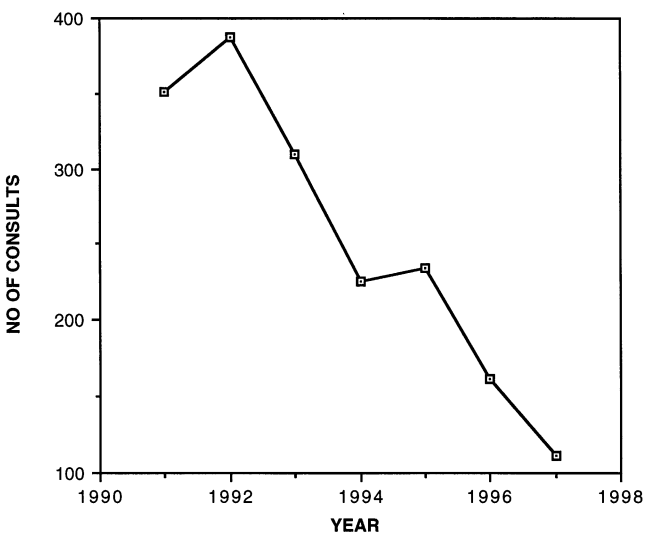

Fig. 1. Total number of requested cardiology consultations by year.

the PATC. Usually 75–80 patients per day are evaluated, for a total of about 18 500 assessments per year. The vast majority of these patients are ASA class II and III. An additional group of patients is evaluated via phone screen as described below.

The PATC is a self-contained area staffed with surgical, anesthesia, nursing, support staff, and laboratory personnel so that the patient can usually receive all preoperative evaluations required in a single location. The average patient visit length including all evaluations lasts about 2 h. A collaborative effort among the departments of anesthesia, nursing, and hospital administration is required. An anesthesiologist serves as Director of the clinic; this Director reports to both the hospital Vice President for Surgical Services and the Chairman of the Department of Anesthesia. A non clinical administrative manager and support staff report to the anesthesiologist serving as Director. Although nursing reporting lines lie with the operating room Nurse Manager, the day to day clinical roles of the nurses in the PATC are defined by the Director in conjunction with the operating room Nurse Manager. Staffing and budget issues for the PATC, including the majority of the PATC nursing budget, are made by the Director and approved by the Vice President for Surgical Services.

Current anesthesia staffing includes one attending physician, one nurse anesthetist, and two residents, with a 'late' resident staying to see late appointments and unscheduled late patients. Expectations and guidelines for performance in the PATC are clear and are distributed throughout the anesthesia department. Residents and staff are expected to evaluate a minimum of 15 patients per day.

Patient appointments are generally booked by a surgeon's secretary through a central system after registration and insurance precertification have been performed. The surgeons office then sends a packet to the PATC which contains the surgeon's office notes, the history, physical and surgical consent (if performed in the surgeon's office), lab orders, and any information obtained from primary care providers. It is critical that all pertinent information be in the PATC at the time of the patient's visit. Patient visit length is unnecessarily prolonged when time must be wasted tracking down information from primary care providers, cardiologists, or outside test results while the patient is waiting in the PATC. Confidence in the system quickly evaporates when the patient presents to the PATC, the packet is empty, and the patient feels that important medical information has not been communicated.

To prevent these problems, a series of meetings between the PATC operations team and the various surgeons' office staff was completed. These meetings provided the surgeons' office staff with instructions so that a sheet with the following information is placed in each packet sent to the PATC: name and phone numbers of primary care provider and/or cardiologist, date of last office visits, dates of last cardiac testing if any has been performed. The surgeons' office staff have been informed that this information should then be obtained from the appropriate outside offices and included in the packet. Packets are requested in the PATC several days prior to the patient's visit so that a chart can be compiled. The surgeons' offices are aware that prolonged patient PATC visit times, patient dissatisfaction, poor patient care and potential cancellation of the procedure may result if this information is not available.

Patient appointments in the PATC are scheduled via a computer program which has been developed so that patients are evenly distributed throughout the day. Communication via this program with the medical records department allows the patient's old chart to be available at the time of the appointment. Although 'walk-in' patients are accommodated, this number is quite low. Unscheduled patients are discouraged, as scheduled appointments are usually completely filled and unscheduled patients will increase overall patient waiting time for the scheduled patents. Also, a hospital chart and collection of outside information will not be available on unscheduled patients, making the overall appointment much less efficient. The computer program is written such that total number of appointments per day per type of provider should not be exceeded.

When the patient registers at the information desk, the receptionist provides information regarding the providers that will be seen and testing that will be done, with an estimate of visit length. A computerized log records the time of registration. The patient sits in a central waiting area and is seen by the next available nursing, anesthesia or lab provider. Currently the patient returns to the waiting room between interviews. Ideally, the nurse practitioner and lab provider should see the patient before the anesthesiologist, however to expedite patient flow this is not always possible. Times spent with each provider are written on a front sheet so that interview times and patient waiting times can be recorded. A computerized log records the discharge time when the patient leaves the PATC.

Surgical histories and physical examinations are performed in the PATC by service-specific nurse practitioners or physician's assistants on about 50% of patients; the remainder have had this done by the surgeon at the time of the office visit. Whether or not the surgical history and physical is performed in the PATC depends upon which surgical service is involved and whether the total number of nurse practitioner appointments for that day has been filled. If the nurse practitioner sees the patient, this nurse also performs the preoperative nursing assessment. Patients who do not see the nurse practitioner have their preoperative

nursing assessment performed by a registered nurse in the PATC. All patients who come to the PATC are seen by an anesthesiologist.

When the patient leaves the PATC, all data and assessments are collected and a chart assembled for the operating room. The anesthesia attending physician is required to review every abnormal ECG before the patient leaves; this ensures that no unresolved issues remain and also provides an opportunity for resident education when the ECG'S are discussed with the attending physician. Other laboratory data are printed out and filed in the chart by the next morning. The next morning, all charts of patients seen the day before are reviewed by the anesthesia staff so that any abnormal laboratory results can be addressed and other remaining issues can be resolved. The charts are then filed in a chart room in the PATC according to date of procedure and are sent down to the operating room the day before surgery. The anesthesia team assigned to provide anesthesia for the case therefore can review the chart the day before to ensure sure they are aware of all issues and can prepare appropriately. This also helps to avoid delays on the day of surgery.

The surgeons' offices have received general guidelines as to which patients may be evaluated via phone screen and do not need a PATC appointment. ASA Class I and II patients without known cardiac problems who do not require laboratory testing and who have had a surgical history and physical performed in the surgeon's office are not required to come to the PATC. The paperwork from the surgeon's office is sent to the PATC as usual in the patient's packet. The surgeons' office staff schedules the patient through the same central computer program system but schedules the patient as a 'Phone Screen' instead of a PATC appointment. A computer printout of these 'Phone Screen' patients is then sent to the PATC. When this printout and the surgeon's packet containing the history and physical are received in the PATC, the patient receives a telephone screen by a PATC nurse which is placed in the patient's chart, assembled and filed as usual. Any patient in whom the telephone interview reveals an area of concern is discussed with the attending anesthesiologist and may be scheduled to appear for an appointment. Since institution of this program fewer than 1% of phone screen patients have needed PATC appointments and there have been no operating room cancellations as a result of inadequate phone screen interviews. The preoperative nursing assessment is done during this phone call with the nurse, eliminating the need to perform this assessment on the day of surgery. This decreases the operating room turnover time for these cases, which are usually short day surgical procedures. Patients also receive preoperative instructions, fasting (n.p.o.) orders, and instructions regarding which medications should be taken on the morning of surgery. This eliminates problems with phone screen patients arriving on the day of surgery without having followed appropriate n.p.o. and medication guidelines.

All PATC anesthesia personnel are instructed to notify the anesthesia scheduling office via e-mail with particular patient issues of which the assigned anesthesia team should be aware. These issues may include potential difficult intubation, severe cardiac compromise, Jehovah's witness, pregnant patients coming for non-obstetric surgery, latex allergy, etc. Identifying these issues aids with operating room scheduling, ensures appropriate equipment is available, and aids in departmental uniformity regarding anesthesia care.

4. Increased patient satisfaction via patient focused preoperative assessment

The preoperative clinic provides a vehicle through which the hospital can promote its mission of patient focused care. A successful preoperative clinic visit will foster in the patient a sense of confidence in the hospital and health care providers and put the surgical experience in a positive light. A disorganized, inefficient, incomplete visit during which a sense of concern for the patient is not expressed will result in low patient satisfaction and loss of confidence in the hospital and the surgical process. It is essential to stress the importance of patient centered interaction and an attitude of competence, compassion and caring with all members of the PATC team. Front-line service has a strong influence on the patient's perception of a hospital's performance.

The team concept is fostered by uniting all PATC personnel, including all types of clinical providers as well as support staff, under a single administrative team. It is difficult to foster the team concept of a patient oriented service line in a preoperative evaluation clinic in which multiple lateral providers work via different reporting lines and consider their roles in a unifunctional manner. Our preoperative clinic holds regular staff meetings attended by all members who work in the unit. These meetings foster a team approach to problem solving and generate a positive feeling regarding the unit's mission which can be transmitted to the patients. All personnel roles in the PATC are essential to the success of the overall mission.

The patient's family members are encouraged to be present during all interviews and their concerns are addressed as well. Courteous behavior, a professional appearance, and expressions of genuine concern are fostered. All personnel are instructed to address the patient by name, to introduce themselves professionally, and to conduct the interview with the patient in a respectful and empathetic manner. Although our providers must see large numbers of patients with sig-

nificant time constraints, the concern and caring perceived by the patients is reflected in the high ratings our unit receives in patient satisfaction surveys even during these short visits

5. Residency training in preoperative evaluation

It is essential that anesthesia training programs include opportunities for residents to learn the skills required not only to perform effective preoperative evaluations but to potentially take a leadership role in the organization and operation of the preoperative clinic in the particular practice the resident joins upon the completion of training. Development of patient interviewing skills and an understanding of the value of good patient communication is essential. Anesthesiologists who are accustomed to the limited patient interaction in the operating room may perform very poorly in the preoperative clinic environment if these skills have not been emphasized during residency.

At the Brigham and Women's Hospital, all 1st year anesthesia residents spend 1 or 2 days during their first 2 months in the preoperative clinic with the attending anesthesiologist as their tutor. During the next 2 years, each resident will spend a 2 week rotation in the preoperative clinic. A curriculum and expectations for competency in areas of preoperative assessment are provided. Residents are evaluated at the end of the two week rotation. They also receive feedback on a daily basis if there are particular issues with specific evaluations. Feedback is also provided to any anesthesia staff member when issues arise because of preoperative evaluation; this ensures alignment throughout the department. Continually reinforcing expectations and guidelines prevents issues with the anesthesiologist scheduled to provide anesthesia for the case disagreeing with the assessment performed in the preoperative clinic.

A number of major academic centers have in place similar programs for residency education in preoperative assessment; other centers are just beginning to investigate effective ways of incorporating this area into their training programs.

6. Laboratory testing

Most care providers are well aware that the previous practice of randomly ordering batteries of test prior to surgical procedures was costly and inefficient, with little impact on patient management [4,5]. A review of 15 studies researching the utility of routine chest X-rays concludes this to be a practice reserved only for patients with clinical evidence of pulmonary disease or those undergoing intrathoracic surgery [6]. Urinalysis in asymptomatic patients rarely leads to beneficial changes in management [7,8].

We have significantly decreased the amount of preoperative testing by streamlining our laboratory order form based on the literature available. The order form includes indications for testing so that guidelines can be followed by anyone using the form. In general, no lab testing is required for otherwise healthy males or nonpregnant females less than age 40. ECG's are required for males over age 40 and females over age 50. Hematocrits are required for all patients over age 40. Chest X-rays are done only in the patient with significant pulmonary disease, heart disease, or malignancy. Urinalyses are performed only in cases of joint replacement or suspected urinary tract infection. All other laboratory testing should be based on concurrent medical conditions. These guidelines are fairly conservative; some other institutions have decreased requirements further depending on anticipated type of anesthetic and relative risk of surgical procedure.

7. Cardiology and internal medicine consultation

As Fig. 1 illustrates, we have significantly decreased the number of cardiology consultations requested despite an increase in both volume and acuity level of patients assessed. In 1997, approximately 18 500 patients were evaluated in the preoperative clinic; the number of requested cardiology consultations was 111. This is the result of several factors; firstly, a new emphasis on patient assessment in our training program. More importantly, the anesthesiologists who work in the PATC at our institution have developed expertise in functioning as consultants in the area of preoperative assessment; in communicating appropriately with the patient's existing primary care providers and outside cardiologists, and in obtaining and reviewing all appropriate information. We provide algorithms for cardiac evaluation and train our staff to be familiar with the literature available [9]. If the anesthesiologist does decide that a patient requires a consultation with a cardiologist, this is arranged by the PATC clerical staff. A hospital cardiologist is usually available within an hour of the request for consultation. Because of the emphasis placed on education of the anesthesia staff in the area of preoperative assessment and improved interdepartmental communication, consults obtained are phrased in a tone such that specific questions for the patient involved are answered. The cardiologist is not asked for 'clearance', but rather if further testing would be beneficial or if suggestions could be made regarding medical optimization prior to surgery. This greatly improves the usefulness of the consults obtained.

In summary, effective organization of the preoperative evaluation clinic can significantly improve operat-

ing room efficiency, decrease laboratory testing and consultation, and provide increased patient satisfaction with the surgical process. Unification of previously lateral clinic providers under a single administration has been an effective method of fostering a team concept and achieving the unit's mission of patient focused care.

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Ambulatory Surgery

Anaesthesia for groin hernia repair—the patient choice

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Abstract

Several anaesthetic options are now available for the repair of groin hernias. The benefits of the local and general anaesthetic techniques are well outlined in the literature. No studies, however, have assessed the patient's preference for different anaesthetic approaches of their suitability of choice in elective hernia repair. A cohort of 284 consecutive patients seen in a dedicated hernia clinic were included in the study. Full medical history and hernia exmination was performed by one cinician. Patients having surgery were offered either general or local anaesthsia for their repair. They were given a full explanation of the steps of both anaesthetic techniques. A clinic information form was provided to assist in the decision-making process. Their favourable options and the reasons behind them were recorded in study sheet, for later analysis. The data were analysed in relation to age, sex, occupation, smoking, medical condition, previous anaesthsia, and previous hernia surgery. Most patients preferred local anaesthsia. Patient's choice was prompt and appropriate. A detailed account of the reasons that influenced the choice of different groups of patients and how that can assist in planning hernia services in district hospitals are discussed.

Keywords: Anesthesia; Groin hernia repair; Patient choice

1. Introduction

Several anaesthetic options are now available for the repair of groin hernias. The benefits of local anaesthesia have been well outlined in the literature [1,2] and include early mobility and reduction in hospital stay, post operative discomfort and peri operative morbidity. General anaesthesia has become safer in recent years particularly in the elderly. No studies have assessed the preference of patients for different anaesthetic approaches or their suitability of choice in elective hernia repair.

2. Aims

The aims of this study were to determine patient preference for anaesthetic technique and the factors which affect this choice in different patient groups.

3. Patients and methods

A cohort of 284 consecutive patients seen in a dedicated hernia clinic over a 14 month period (November 1995–January 1997) was included in the study. A full medical history and clinical examination was performed by one clinician. The data obtained was prospectively recorded on study sheets for later analysis (Table 1). Patients having surgery were offered either general or local anaesthesia for their repair and were given a full explanation of both anaesthetic techniques. A clinic information form was provided to assist in the decision-making process (Table 2). No attempt was made to influence the choice of anaesthesia and the favoured option by the patient including the reason(s) for choice was recorded. In those cases where the preferred patient option was deemed by the surgeon to be either technically inappropriate or ill-advised, the technique was left to the surgeon on discussion with the patient.

4. Statistics

Percentage differences between groups were analysed by the χ^2 test with Yates correction. In groups with

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relatively small numbers, Fisher's exact test has been used. *P*-values were considered significant if less than 0.05.

5. Results

In total 315 patients presented to the clinic over the study period. Thirty-one cases were excluded from analysis for a variety of reasons including 4 patients with hydrocoele only, 6 cases of groin pain where no hernia was clinically detected, 9 infants with inguinal herniae, 6 patients with clinical herniae who refused an operation and 6 patients who equivocated about their preferred type of anaesthesia.

Of the 284 patients included in the study 276 (97.5%) decided upon anaesthetic type at the initial clinic visit. Of 6 patients who required some extra time before they were able to decide 4 opted for general anaesthesia. A further 2 patients needed a second visit accompanied by their relatives for further discussion and both opted for local anaesthesia. In only 5 cases did the surgeon feel that the patient's preferred option was inappropriate. In 3 of these cases, general anaesthesia was advised for patients who had opted for local anaesthesia. One of these cases had a giant irreducible inguino-scrotal hernia and two had had a prior history of intractable epilepsy. Only 2 patients who had opted for general anaesthesia were advised to have local anaesthesia. Both cases had a prior history of severe chronic obstructive airways disease.

All patients accepted the surgeon's recommendations and 281 (98.8%) opted to have their surgery performed as day cases.

Table 3 shows the reasons for individual patient choice of anaesthesia. Early mobility and avoidance of post-anaesthetic effects (in particular vomiting and drowsiness) were the commonest reasons provided by patients choosing local anaesthesia. The concern of being awake during the procedure and fear of needles were amongst the commonest reasons given by patients opting for general anaesthesia.

Table 4 shows the patient characteristics of each anaesthetic group undergoing hernia repair. There were more patients in the local anaesthetic group (202 patients, 71%) with those opting for local anaesthesiaincluding manual workers, smokers and patients with significant comorbidity, most notably cardiorespiratory and cerebrovascular disease.

Table 1
Hernia data collection sheet

Personal data						
Name:			Hospital No:			
Age:			DOB :			
Sex:	M ☐		F ☐			
Smoker:	Yes ☐		No ☐			
Occupation:						
	Retired ☐		Manual ☐		Nonmanual ☐	
History						
C/O	Pain ☐	Swelling ☐	Other ☐	Duration…		
Past medical history:						
Chest	Heart	CVA	Diabetes	Prostate	MS	Others
Previous groin hernia surgery:						
Same side:	Other side:	LA:	GA:			
Previous general anaesthetic:						
Examination						
Hernia						
+ve						
	Side	Right ☐	Left ☐	Bilateral ☐		
	Type					
		Inguinal ☐	Direct ☐	Indirect ☐	Femoral ☐	
		Recurrent ☐		Nonrecurrent ☐		
−ve	1st exam	2ed exam	3ed exam			
		Investigations	CT	MRI	Herniogram	
		Result…				
Patient preference						
	L/A ☐	G/A ☐	Reason			
	DS ☐	Inpatient ☐	Reason			
Surgeon preference						
	L/A ☐	G/A ☐	Reason			
	DS ☐	Inpatient ☐	Reason			

Table 2
Local and general anaesthetic repairs as explained to the patients

The method of repair itself is essentially the same whether you are having the operation under local or general anaesthesia.The difference is in the type of anaesthesia you may have.

Local anaesthesia

If you decide to have the operation done under local anaesthesia, you will have a needle inserted into the back of your hand and you will receive an injection which will relax you but won't put you off to sleep completely. The surgeon will then give you an injection (the local anaesthetic injection) into the groin to make the operation site numb. Most people don't find this injection too uncomfortable. You will not feel any pain during the operation but will feel the surgeon touching you and may feel a sense of pushing and pulling in your groin. If you should feel any pain you will always be able to tell the surgeon who may give you more of the local anaesthetic injection. You will be fully monitored for the entire time of the operation. After the operation you will be up and about and able to go home the same day.

General anaesthesia

General anaesthesia simply means that the anaesthetist will give you an injection to send you off to sleep and you will not be aware of what is going on around you. During this period the anaesthetist will keep you safe by monitoring your body functions. As soon as the operation is over, the anaesthetist will wake you up again. After you wake up from the anaesthetic you will need a short period of recovery. You will then be encouraged to be up and about. Some people feel sick after the operation and anti-sickness injection may be needed to stop this feeling. Most patients are able to go home the same day. Some however, may need a longer time to recover fully and they may then need to stay overnight.

Local anaesthesia proved equally popular in both sexes (71.5% for males versus 66.6% for females).

Local anaesthesia was the preferred option amongst the retired population (74.5%), manual workers (71.6%), and sedentary occupations (60%). Of the manual workers choosing 90% were self employed.

The concomitant medical problems assessed in our study included cardiac disease, respiratory ailments, cerebrovascular disease, epilepsy, diabetes, multiple sclerosis and prostatism. Although the same percentage of patients with significant medical comorbidity (71%) opted for local anaesthesia as those without medical ailments, 32.4% of patients with attendant medical disease cited their medical condition as the prime reason for the preferred anaesthetic choice.

In those patients who had experienced general anaesthesia before, 70.8% preferred local anaesthesia for their hernia repair These patients cited a litany of previous bad experiences with general anaesthesia as their principal reasons for choice of local anaesthesia on this occasion.

Forty-two patients in the study presented for surgery because of hernia recurrence. Local anaesthesia was preferred by 76.2% of this group although only 2 patients who had had a previous repair under local anaesthesia requested a repeat local anaesthetic approach.

One quarter of patients in the study were smokers. Of these, 67.6% preferred local anaesthesia compared with 72.2% of non-smokers ($P = 0.46$). Smokers opting for local anaesthesia cited concerns in 26% of cases that a general anaesthetic would precipitate a chest infection.

Table 3
Reasons provided by patients for their choice of anaesthesia

Local anaesthesia	No.	General anaesthesia	No.
Concern about feeling sick after surgery	28	Concern of being awake during operation	59
Rapid recovery/early mobility	46	Needle phobia	7
Expectation that surgery will be likely to be a day case	30	Prior satisfaction with general anaesthesia	6
Fear of general anaesthesia	10	Heard from friends and media about cases of sever pain under local anaesthesia	4
Cited as novel experience by the patient	8	No knowledge of local anaesthesia	4
Bad experiences with prior general anaesthesia	16	Concern about keeping still during the procedure	2
Heard favourable comments from friends about local anaesthesia	17		
Concern about exacerbation of pre-existing medical illness	24		
Smokers and concerned about cough/chest infection after surgery	12		
Prior favourable experiences with local anaesthesia	3		
Ability to eat immediately following surgery	4		
Concerns about postoperative urinary retention	2		
No reasons provided	2		
Total	202		82

Table 4
Characteristics of patients undergoing hernia repair for each anaesthetic group

Characteristics	Local anaesthesia		General anaesthesia	*P*-value
	No.	%	No.	
Mean age (year)	59		53	
Age range	18–86		22–82	
Sex				0.61*
Male	186	71.5	74	
Female	16	66.6	8	
Occupation				0.22
Manual	96	71.6	38	
Sedentary	24	60.0	16	
Retired	82	74.5	28	
Previous GA				0.94
Yes	68	70.8	28	
No	134	71.3	54	
Smokers				
Yes	46	76.6	22	0.47
No	156		60	
Medical comorbidity				0.99
Yes	74	71.1	30	
No	128		52	
Associated type of medical illness				0.02†
COAD	18		2	
Cerebrovascular	10		2	
Prostatism	9		9	
Past MI	11		2	
IHD	14		3	
Diabetes	9		8	
Epilepsy	2		2	
MS	1		2	

COAD, chronic obstructive airways disease; MI, myocardial infarction; IHD, ischaemic heart disease; MS, multiple sclerosis.
* χ^2-test; † Fisher's exact test.

Table 5
Anaesthetic preferences for the different patient age groups*

Age group (years)	No.	LA		GA
		No.	%	No.
18–30	26	12	46.2	14
31–40	28	18	64.3	10
41–50	36	24	66.7	12
51–60	52	40	76.9	12
61–70	70	52	74.3	18
71–80	58	44	75.9	14
81–90	14	12	85.7	2

* Overall *P*-value = 0.06 (χ^2-test).

Of those patients presenting with bilateral herniae (50 cases), 80% chose local anaesthesia. This was despite the fact that the unit policy was to conduct bilateral hernia repair under local anaesthesia as a staged approach and under general anaesthesia at a single session.Overall local anaesthesia was more popular ($P = 0.06$). Only in the under 30 years group was it less popular than general anaesthesia. In patients 80 years and over, 85.7% preferred local anaesthesia (Table 5).

6. Discussion

There are a range of anaesthetic techniques available for hernia repair. General anaesthesia is both reliable and familiar and has been shown to be safe for use in most age groups and in day cases. The performance of hernia repair under local or regional anaesthesia is now an accepted alternative with many reported advantages [3–8]. This study assessed patient preference for types of anaesthesia in elective hernia repair and its role in the final operative decision.

There was wide patient variation in age, sex, occupation, smoking habits and anaesthetic risk, with males, manual workers, smokers and those with perceived significant medical comorbidity opting more often for local anaesthesia.

Overall, patients preferred local anaesthesia and patient choice was prompt and appropriate in most cases. The reasons most frequently given for a choice of local anaesthesia included the desire for early mobility and the perceived ill effects (most notably nausea) from general anaesthesia. The main reasons given for avoidance of local anaesthesia were concern about being awake during the operation and needle phobia.

Many studies have shown that the future of hernia surgery lies in the establishment of dedicated hernia units with a shift from general anaesthesia to local anaesthesia [3,6,8–10]. Our study, taking into account patient choice in decision making, would seem to be in agreement with this type of approach and that of day case specialists in hernia repair.

Much has been done in recent years to increase the number of hernia cases repaired on a day surgery basis. Little attention has been paid to the provision of this service routinely on a local anaesthetic basis in dedicated centres. Limited awareness by regional health authorities of the increased patient satisfaction with local anaesthesia coupled with the biases of many surgeons towards general anaesthesia with very selective use of local anaesthesia have contributed to the relatively high rates of general anaesthesia for routine hernia repair in many district general hospitals. Many surgeons will often cite other reasons, most notably concern about patient discomfort, lack of muscular relaxation, as well as the potential haemorrhage and disturbed anatomy after infiltration, as the determining factors for choosing general over local anaesthesia to achieve a satisfactory repair in their patients [11].

We believe that acceptance of local anaesthesia among surgeons and their willingness to use it should be encouraged, particularly in the district hospital setting. Formal teaching of the technique is advisable [12] and raises the question of credentials and accreditation should colleges wish to go down the route of dedicated hernia practice and audit [8,9]. Health authorities may look to hernia surgery as more of a surgical speciality with managers factoring in the costs of specialised surgical and nursing training with reduced hospital stay, analgesic requirements, secondary admissions and theatre fees. The true cost-benefit of such an approach needs to be ascertained in prospective trials [13].

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Ambulatory Surgery 7 (1999) 145–150

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Comparison of propofol and ketamine-midazolam for cystoscopy: A randomized trial with clinical economic analyses

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Abstract

Objectives: We compared the duration and quality of recovery and the cost of anesthesia between propofol and ketamine-midazolam for cystoscopy as a model to explain the decision in a tertiary care, government hospital in a developing country. *Methods*: This is a randomized, double-blind trial. Forty-eight male patients were randomized to receive propofol or ketamine-midazolam. Recovery was evaluated by a series of clinical tests, modified P deletion and Stroop color tests, and the time to discharge. Patients' pain score, satisfaction score and willingness to pay were evaluated. Direct medical cost from the perspective of health care provider was calculated. Cost-effectiveness and cost-benefit analyses were done. *Results*: Although clinical recovery was not different, both psychomotor tests showed that patients in the propofol group recovered significantly faster. They were able to stand, walk and meet the discharge criteria faster ($P < 0.05$) and had fewer side effects. However, pain and satisfaction scores and the willingness to pay were not different. For each patient, propofol cost 12.31 US dollars more but the patient recovered 44.8 min faster than with ketamine-midazolam. When this faster recovery time was changed into monetary units, propofol did not save money but cost 9.03 US dollars per patient more than ketamine-midazolam. Patients' expectation and salary scales can affect decision-making.

Keywords: Clinical economic analysis; Ambulatory anesthesia; Propofol and ketamine

1. Introduction

Pain and discomfort during cystoscopy, a very common procedure to diagnose and treat diseases in the lower urinary tract, can be alleviated using local, regional and various general anesthesia regimens. Total intravenous general anesthesia is one suitable choice; but among the intravenous drugs, propofol claims fast and clearer recovery, whereas the cheaper drug, ketamine, has a longer elimination half-life and recovery. An anesthesiologist acting as the agent of the patient may want to use the newer drug. However, effectiveness information may not be enough for him to decide which drug is more suitable for his patients in his environment and budget.

We proposed to compare propofol and ketamine-midazolam in cystoscopy patients not only in an effectiveness study but also cost-effectiveness and cost-benefit analyses. Recovery was assessed by clinical tests, psychomotor tests, and the time until the patients were eligible for discharge. We also compared the patients' pain, satisfaction, and willingness to pay between the two techniques.

2. Materials and methods

This is a randomized, double blind trial. The permission to study was granted by the Hospital Committee on Human Rights Related to Research Involving Human. Inclusion criteria were male patients who were to have cystoscopy, had no or mild systemic diseases, had nothing per oral for 6 h, had no premedication and gave their informed consent. Exclusion criteria were patients who could not cooperate, had psychological or motor power problems or who were expected to have a procedure which lasted more than half an hour.

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Lidocaine jelly (10 ml) was applied into the urethra in lithotomy position in all patients. Five minutes afterwards the patients received:

1. Group 1 ($n = 24$): intravenous propofol 2 mg/kg then 40–60 mg incremental dose when the patients showed sign of need, e.g. movement, facial expression. Lidocaine 20 mg was given together with the first 100 mg of propofol to decrease the pain on injection [1].
2. Group 2 ($n = 24$): intravenous ketamine 0.5 mg/kg plus midazolam 0.04 mg/kg then ketamine 0.25 mg/kg incremental dose when they showed the same sign of need.

Cardiovascular and respiratory functions were monitored using automated blood pressure, pulse rate and pulse oximetry (Colin BX-5) and electrocardiogram. One anesthesiologist, who was not blinded to the drugs, gave all anesthesia. The airway was manually supported when there was sign of airway obstruction and oxygen supplement (2 l/min) via nasal cannular was given when the hemoglobin oxygen saturation fell below 92%.

In the recovery room, recovery was evaluated with a series of clinical tests, two psychomotor tests, and discharge criteria as follows:

1. Clinical recovery tests. The time from the end of anesthesia to the time the patient could open his eyes when called, tell his name and date of birth, lift his head for more than 5 s, sit and then stand and walk 3 m unaided were recorded.
2. Modified P deletion test [2]. The patient was asked to select one particular letter of the alphabet from a list of random alphabet letters. This test was applied every 10 min until he could choose correctly within $\pm 10\%$ of preanesthesia baseline value. We modified the test by using local language and made sure that they were large enough for our patients to read. Different sets of alphabets were used to prevent patients from remembering the sequence.
3. Stroop color test. The patient was asked to call out the color (blue, red or green) of markers. The test was applied every 10 min until he could reach $\pm 10\%$ of the preanesthesia baseline value.
4. Time to discharge. This was the time from the end of anesthesia until the patient fulfilled all the previous clinical criteria, had stable cardiovascular and respiratory status, drank water with no nausea or vomiting, and was able to dress and walk about unaided.

These tests were evaluated by two trained investigators who were blinded to the drugs given, in similar lights and under the same environment for both groups. They were sequenced so that patients were allowed time to complete each test and proceed through more difficult tests until they were eligible for discharge. Postoperative side effects (nausea, vomiting, vertigo, headache and bad dream) were recorded.

Before discharge the patient was asked to evaluate pain during the procedure by a visual analogue scale (VAS); zero meant no pain at all and 10 meant the worst severe pain imaginable. Satisfaction towards anesthetic technique was also assessed by VAS, zero meant not satisfied at all and 10 meant fully satisfied. His 'willingness to pay' was assessed by gradually increasing the amount of money from 20 US dollars, the normal charge for cystoscopy under local anesthesia. The patient was asked to indicate the highest price that he would be willing to pay for cystoscopy under the anesthetic technique he just had, if he were to have cystoscopy again.

The direct medical cost from the health care provider's perspective consisted of personnel cost, equipment cost, drug and consumable item cost [3]. Personnel cost in the operating room (OR) was calculated by multiplying the mean salary per minute of an anesthesiologist (1995 salary scales of all in the department) by the duration of anesthesia. Personnel cost in the recovery room (RR) was calculated by multiplying the mean salary of a nurse by the time the patients spent in RR to fulfil the discharge criteria. The actual amount of drugs and time that monitoring equipment was used were recorded both in OR and RR. The cost per minute of monitoring equipment was deducted from the equivalent annual cost, assuming that all equipment was used for 8 h daily for 270 days per year. The equivalent annual cost was calculated from the purchase price divided by an annuity factor [4]. This factor came from a table that correlated the equipment's expected years of life (according to the American Hospital Association [5]) and the discount rate of 7%. Drugs and consumable item cost were the purchase cost of the Department of Anesthesiology of a government, tertiary care, teaching hospital in Bangkok, Thailand.

In cost-effectiveness analysis, the incremental cost-effectiveness ratio was the difference in anesthesia costs divided by the difference in effectiveness (recovery) between the two techniques. In cost-benefit analysis, effectiveness was translated into a monetary unit [3]. If the more expensive drug resulted in shorter recovery room stay, then net benefit equalled the difference between the saving in RR cost and the cost difference in OR.

2.1. Statistical analyses

Analysis of data was with SPSS/PC. The distributions of data were tested with Kolmogorov–Smirnov Goodness of Fit; variables with normal distribution were compared using Student t-test; continuous, non-normal distributions were compared using Mann–Whitney U-Wilcoxon Rank Sum test. Discrete variables were compared using χ^2 test. $P < 0.05$ was taken as indicating statistical significance.

Table 1
Patients' characteristics were not significantly different

	Propofol ($n = 24$)	Ketamine-midazolam ($n = 24$)
Age (years)	45.9 ± 13.3	54.9 ± 10.6
ASA I/II (%)	83/17	58/42
Had previous cystoscopy (%)	71	83
Anesthesia duration (min)	7.6 ± 6.0	9.7 ± 6.0
Procedure		
Cystoscopy	10	11
Cystoscopy and others	14	13
Income (dollars/month)	210 ± 311	390 ± 451

3. Results

Patients in both groups had comparable ages, physical status according to American Society of Anesthesiologists (ASA) classification, experience of having previous cystoscopy, duration of anesthesia and type of operation (Table 1). The mean incomes of patients had a very large standard deviation and were not significantly different.

The clinical tests showed that the time for both groups to open eyes, tell their names and dates of birth, lift their heads and sit were not different. However, it took the ketamine-midazolam group significantly longer ($P < 0.05$) to be able to stand, walk and meet the discharge criteria. Modified P deletion test and Stroop color test confirmed that patients in the propofol group recovered significantly faster ($P < 0.05$), as shown in Table 2.

VAS pain scores, VAS satisfaction scores, and the maximum amount of money the patients were willing to pay for propofol and ketamine-midazolam were not significantly different between the two groups (Table 3).

Table 2
Clinical recovery tests, psychomotor tests, and the time to discharge

Time to	Propofol (min)	Ketamine-midazolam (min)
Eye opening	7.83 ± 3.99	5.67 ± 9.98
Telling his name	8.21 ± 4.06	6.38 ± 10.14
Recall of birth date	8.83 ± 4.08	7.63 ± 10.27
Lift his head > 5 s	10.46 ± 4.38	8.79 ± 9.97
Sitting unaided	15.38 ± 5.28	29.52 ± 25.32
Standing unaided	28.17 ± 9.04*	45.54 ± 37.47
Walking 3 m unaided	31.58 ± 10.84*	72.50 ± 53.29
Modified P-deletion test	23.13 ± 8.70*	44.17 ± 22.83
Stroop color test	23.33 ± 7.89*	43.29 ± 19.34
Time to discharge	48.04 ± 15.36*	92.88 ± 47.92

*$P < 0.05$.

Table 3
Pain scores, satisfaction scores and willingness to pay (mean ± S.D.) were not different. The number of patients who had vertigo and headache were different

	Propofol	Ketamine-midazolam
VAS pain score	0.2 ± 0.6	0.2 ± 0.5
VAS satisfaction score	9.2 ± 1.1	8.8 ± 1.6
Patients' willingness to pay (dollars)	47 ± 37	56 ± 50
Pain on injection of i.v. drugs	2	0
Need of airway support	4	4
Need of oxygen supplement	5	3
Movement during cystoscopy	8	8
Awareness during anesthesia	0	0
Nausea, vomiting	1	3
Vertigo	1	9*
Headache	0	16*
Bad dream	0	1

* $P < 0.05$.

The mean hemoglobin oxygen saturation (S_pO_2) in both groups was not below 92% and an equal number of patients needed manual airway support. The number of patients who had an S_pO_2 drop to 92% and needed oxygen supplement was not significantly different and both groups responded well to standard treatment. Postoperative vertigo and headache were significantly more common in the ketamine-midazolam group.

Intraoperative cardiovascular changes differed between the two groups. Systolic blood pressure decreased by more than 20% of baseline in seven patients in the propofol group and increased by more than 20% of baseline in six patients in the ketamine-midazolam group. Eight patients in each group had their heart rate increase more than 20% of baseline. No treatment was needed.

The mean total doses of propofol and ketamine given were 227.5 mg and 40.5 mg respectively. Anesthesia cost in the OR in the propofol group was 2.7 times higher than the ketamine-midazolam group (19.63 vs 7.32 dollars per patient), as shown in Table 4. This difference was due to cost differences between propofol and ketamine. But because the propofol group recovered faster, their cost in the RR was lower than the ketamine-midazolam group (3.51 vs 6.80 dollars per patient).

The time until the patients were eligible for discharge was a practical, meaningful outcome to evaluate recovery. In cost-effectiveness analysis, the incremental cost-effectiveness ratio was the difference in anesthesia costs divided by the difference in time to discharge between the two techniques, or $(19.63 - 7.32)/(92.8 - 48.0)$ dollars/min. This meant that, for each cystoscopy patient, if we chose propofol we would spend 12.31 dollars more but the patient would recover 44.8 min faster than if we chose ketamine-midazolam.

Table 4
Direct medical costs of anesthesia and recovery in US dollars

	Propofol	Ketamine-midazolam
In the operating room		
Anesthesiologist	0.64	0.81
Equipment cost	0.22	0.28
Propofol or ketamine	14.10	1.25
Midazolam, other drugs and items	4.67	4.98
Total anesthesia cost	19.63	7.32
In the recovery room		
Nurse anesthetist	3.01	5.83
Equipment cost	0.50	0.97
Total recovery cost	3.51	6.80
Total direct medical cost	23.15	14.12

Propofol group spent 7.6 min in OR and 48 min in RR. Ketamine-midazolam group spent 9.7 min in OR and 92 min in RR.

In cost-benefit analysis, effectiveness was translated into monetary units. From the health care provider perspective, the net benefit equalled the difference between total direct medical costs of the two techniques. When the anesthesia cost and recovery cost were added together, propofol cost more than ketamine-midazolam (23.15 vs 14.12 dollars per patient), a difference of 9.03 dollars. This meant that the saving in RR was less than the saving from choosing ketamine-midazolam in OR.

4. Discussion

Anesthesia in different countries varies due to differences in health systems, reimbursement systems and the expectation of the population. Newer drugs are valuable additions to the anesthesiologist's armamentarium but the cost of these agents is obviously higher than the drugs they were designed to replace [6]. Developing countries have shortages in anesthesia manpower, equipment and drugs. Because of the long waiting lists, minor surgeries are done under local anesthesia by the surgeon [7]. These ambulatory surgeries under local anesthesia are well accepted by health care providers because time between cases is minimized, anesthetic complications are avoided, post-anesthesia care is not needed, and additionally because of cost savings.

However, some procedures, i.e. gastroscopy, cystoscopy, can be painful and humiliating from the patients' point of view, even when local anesthetics has been applied. In our previous study [8] patients who received cystoscopy under local anesthesia by surgeons had a mean VAS pain score of 4.8 ± 2.2, and mean VAS satisfaction score of 6.7 ± 2.1. If they were to have this procedure again, only 39% preferred local to general anesthesia. The bad experience can have a long lasting impact when the patients refuse to come for follow up, which this group usually needs, and can result in late diagnoses and treatment.

Propofol (2,6-diisopropylphenol) has been used in short procedures [9] and its effectiveness was compared with other intravenous drugs, i.e. thiopentone [10,11], opioids [12], benzodiazepine [13,14], inhalation agents [15–17] and other combination of drugs [18]. New opioids such as alfentanil have been used to supplement propofol anesthesia [12,19] but is in itself expensive. Midazolam has been compared with propofol [14] but it had to be antagonized by flumazenil which would have markedly increased the costs had the costs been assessed. Ketamine has been available longer and it costs less. Given intravenously, this drug resulted in a dissociative anesthesia state and had an analgesic effect, even at the dose of 0.2–0.75 mg/kg [20]. Patients were often drowsy in the recovery room and midazolam was given to prevent any emergence phenomenon. That recovery from propofol was faster than from ketamine has been shown in one study in pediatric patients undergoing cardiac catheterization [21] but the costs were not compared. Isoflurane has been shown to have faster recovery than propofol [22] but the recovery assessed by Digit Symbol Substitution Test at as early as 1 h in the recovery room was not different. In that study, 75% of all patients were discharged on the first postoperative day and 25% stayed in hospital for two nights, mainly for social reasons. 'Recovery' and 'time to discharge' should be defined and measured objectively so that the results of the study could be understood.

We have shown that propofol resulted in faster recovery and fewer side effects than ketamine-midazolam. The opportunity cost of a long RR stay is that the bed is not available for other patients. Propofol has a low incidence of nausea and vomiting [23–25]. These side effects were found to delay discharge by an average of 24 min and substantially increased the costs incurred by an outpatient surgical center [26]. It would be very difficult, if not impossible, to change headache, vertigo or a bad dream into a monetary unit, apart from counting the cost of drugs given to treat the symptoms, which we did. These adverse symptoms could be considered intangible costs but they were recognized by the longer time to discharge in the ketamine-midazolam group.

This study can be a model for other investigative procedures and minor surgeries, in this country and other countries with the same budget problems. The incremental direct medical cost of propofol over ketamine-midazolam per one patient was 9.03 dollars, but if all cystoscopies in the country were to receive propofol anesthesia, the increase in cost would be significant. Culture and expectation may have affected the measurement. Although recovery time and side effects were

different, satisfaction towards anesthesia in the two groups was high and not different. This may be because their pain scores were not different and the patients were never exposed to the alternative drug. Our patients confirmed their satisfaction of intravenous anesthesia when they gave the figure for their willingness to pay 2–3 times higher than the amount they used to pay for cystoscopy under local anesthesia. 'Who pays' will affect the final decision whether an intravenous anesthesia service should be started and which drug should be used. For this cystoscopy the patients did not have to pay the amount they said they were willing to. The amount had a wide standard deviation, as had the mean income. We have not proved whether they would change their preference if they were to pay out of pocket in the future. However, the costs incurred by the department were lower than the amount the patients were willing to pay. So if the cost of care is affordable by the patient or a third party, the hospital may want to offer the service.

Around the world, governments are attacking spending deficits. No country can afford the health care that is available [27]. Improving the quality of anesthesia may not have a major impact on survival. Research with efficacy or effectiveness of drugs as main outcomes is sometimes only partially useful. New drugs and technology are assumed to be more effective, but economic analyses, using regional cost and effectiveness/benefit can lend an insight into the clinical practice and help in decision-making. These techniques have clearly entered anesthesia literature [28–30] and anesthesiologists have to understand their advantages and limitations.

The result of economic analysis varies across countries. Long recovery times will affect the total cost in hospitals with high personnel cost more than what occurred in our hospital. A UK study reported the cost of a recovery room nurse at 16.96 US dollars/h [30] compared to our cost of recovery room nurse of 3.77 dollars/h (estimating 1 British pound = 40 Thai baht and 1 US dollar = 25 Thai baht, exchange rate in 1995). If UK personnel costs were used in our study, choosing propofol would result in a saving of 0.84 dollars per patient. In this scenario, the anesthesiologist cost would also increase but the duration of anesthesia was not much different between the two groups and would have less impact than personnel costs during recovery. Drug costs also vary and change with time. A change in monetary exchange rates greatly affects all commodities and decisions.

We concluded that propofol was more effective, resulting in faster and higher-quality recovery than ketamine-midazolam, even though pain and satisfaction scores evaluated by the patients were not different. However, when we translated the shorter recovery room stay into a monetary unit, from the perspective of a health care provider, propofol was not more cost-beneficial than ketamine-midazolam. This is the common scenario in developing countries where drug cost is high and personnel cost is low. Varying personnel cost could shift the cost-beneficial analysis and propofol could become more cost-beneficial, as in countries with high salary scales. Although we found that clinical economic analyses helped us gain insights into the medical practice, there were still some technical problems and some clinical outcomes that could not be translated into monetary units.

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Ambulatory Surgery 7 (1999) 151–153

Ambulatory Surgery

Trabucco's 'suture-less tension-free' hernia repair: technique, local anesthesia and results

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Abstract

Hernia repair has always been performed by approximation of the inguino-crural structures. Since these structures are not normally in apposition, their approximation may be associated with undue tension on the suture line: this can cause recurrences. 'Tension-free' techniques solved this problem, and permit a remarkable reduction in recurrence rate.

Keywords: Hernioplasty; Local anesthesia; Polypropylene mesh; Recurrences

1. Introduction

There is histological and biochemical evidence that inguinal hernias can be caused by a metabolic disorder involving collagen turnover of the transversalis fascia [2–4].

The use of synthetic material in the repair of hernias seems a more logical approach.

Biomaterial can permanently replace the defective transversalis fascia and permit the creation of a true tension-free hernioplasty. Polypropylene mesh has proved to be the most suitable synthetic mesh, achieving four major objectives: no rejection, no infection, early fixation and host tissue incorporation. Trabucco's technique is suitable for treatment of hernias under local anesthesia in the outpatient department or on a short-stay or day surgery basis.

2. Materials, methods and results

From March 1992 to March 1998, in the first Department of General and Emergency Surgery of S.M. della Misericordia Hospital (Udine, Italy), we performed 1416 Trabucco's tension-free sutureless hernioplasty operations in 1325 patients (male, 91.5%; female, 8.5%; mean age, 59.3 years, range 18–92). The hernias were: primary, 95.5%; recurrent, 4.5%; indirect, 58.5%; direct, 40.3%; congenital, 1.2%; bilateral, 6.9%.

The patients were admitted to hospital on the previous day or on the morning of the operation. In the latter case, they underwent pre-operative tests on an outpatient basis. We administered routinely local anesthesia (Table 1), regardless of the setting (emergency versus planned), using a buffered anesthetic solution (bupivacaine 0.50% 20 ml + xylocaine 0.2% 20 ml + sodium bicarbonate 8.4% 10 ml + isotonic sodium chloride solution 40 ml). Our technique consists in a locoregional approach based on anesthesia of the ileohypogastric and ileoinguinalis nerves in association with step-by-step infiltration of the oblique or transverse incision line.

Table 1
Methods of anesthesia employed

Anesthesia	%
Local	93.0
General	3.0
Spinal	3.5
Conversion (to general)	0.5

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Peculiar elements of Trabucco's technique are: (1) indirect inguinal hernias: dissection of the sac without opening it, if possible. Introflection of the sac in the deep ring followed by a plug. (2) Direct inguinal hernias: dissection and invagination of the direct sac with or without placement of a plug. (3) Implant of the preshaped mesh over the posterior wall of the inguinal canal. (4) Suture of the external oblique aponeurosis over the preshaped mesh medially and laterally to the spermatic cord which remains in a subcutaneous position.

For mesh and plug we use monofilament polypropylene of surgical quality and controlled memory produced by Herniamesh.

The post-operative complications were: scrotal oedema, 0.9%; collection of serous fluid, 2.1%; hematoma, 0.8%; partial reopening of the wound, 1%; bacterial dermo-epidermitis (healed within 90 days without removal of the prosthesis), 0.07%. The only intraoperative complication observed was inconsequential vagotonic reaction (bradycardia) treated with atropine, 0.9%. The long-term complications were: long-lasting (2 months) inguinal neuralgia, 0.6%; and testis atrophy, 0.1%. Recurrence rate was 0.3%, and the mean hospital stay was 2.1 days.

3. Discussion

The results of the traditional surgical techniques of hernia repair, based on the direct reconstruction of the wall (Bassini, McVay, Shouldice), cannot be considered excellent. In fact, the recurrence rate may be very high (10–15%) [4,6]. Lichtenstein identified, as the principal factor for recurrence, the tension on the suture line, due to the bringing together anatomical structures usually distant. In nearly 90% of the cases, the recurrence is located in the extreme points of the repair, where the tension is greater (pubic tubercle and deep inguinal ring) [4,5]. This mechanism is the basis of the 'mechanic' recurrences, that usually occur within 2 years of the operation [5].

Alterations of collagen metabolism (decrease of hydroxyproline contents, decrease of insoluble polymeric component, total decrease of synthesis, decrease of the $\alpha 1$ [I]/$\alpha 1$ [III] ratio), causing a real weakness of aponeurosis and fibrous structures [2] that predisposes to recurrence, are seen in patients with hernias. In fact, patients with collagen diseases (Marfan's disease, Ehlers–Danlos' syndrome, osteogenesis imperfecta) are very frequently affected [2]. The intrinsic tissue weakness of the wall can explain late recurrences, called 'metabolic', that appear even many years after the operation [5].

The use of prosthetic synthetic nets allows a reconstruction without any tension of the normal anatomical structures and a real strengthening of the wall [3,4,6–8].

Of the prosthetic materials, Marlex (polypropylene) shows the best features, because it is strong, inert, easily available and very resistant to infections [4]. Because of its thin and porous structure, it is completely penetrated by fibroblasts [3,4] and, by inducing an intense inflammatory reaction, stimulates collagen synthesis [2]. The result in time is a solid fibrous coat that effectively strengthens the inguinal wall.

With his 'tension-free' hernioplasty, Lichtenstein [4] obtained excellent results, with a recurrence rate not higher than 0.1% [1], and stimulated many surgeons to use the technique and try to improve it.

The Trabucco 'sutureless' operation [8] represents a technical evolution, because it avoids neuralgias due to the trapping of sensory nerves and removes the tension: in addition it is a quicker operation.

Reconstruction without tension of the wall does not require post-operative immobilization and generally does not necessitate any antalgic functional limitation [3,4,6,8]: it permits a very fast restoration of full physical and working activity by the patient, with clear personal and social savings and a lower cost to the community. The use of local anesthesia reduces general and local complications. Moreover the conscious patient can perform Valsalva's manoeuvre or cough to evidence unknown hernias or immediately verify the effectiveness of the reconstruction.

We started performing Trabucco's sutureless hernioplasty in March 1992 under general anaesthesia. After suitable training we changed to local anaesthesia that we now use routinely.

Among this technique's advantages we would emphasize the virtual absence of post-operative pain, the effective very fast recovery of normal working activity by our patients, and the excellent Marlex resistance to infections.

4. Conclusions

Inguinocrural hernioplasty is one of the most common operations in general surgery. In the past Bassini's techniques gave us good results but not complete satisfaction, due to the high recurrence rate. For this reason we began to study the problem with the specific goal of improving our approach to hernia pathology. We started performing Trabucco's tension-free sutureless hernioplasty under local anesthesia 6 years ago. A total of 1416 operations have been performed with a low number of recurrences (0.3%) and without any major complications. This procedure has the benefits of very low recurrence rates, absence of complications and of post-operative pain, immediate normal ambulation and good social impact (decreasing costs, faster recovery of working activity).

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Ambulatory Surgery 7 (1999) 155–157

Ambulatory Surgery

Clinical indicators for day surgery

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Abstract

As the number, variety and complexity of day procedures increase it is clearly important to ensure maintenance (and improvement) in the quality of the care given. To do so the Australian Day Surgery Council, assisted by the Australian Council on Healthcare Standards Care Evaluation Program, introduced five generic performance indicators. They were addressed by 240 healthcare organisations in 1997 reflecting the management of over 380 000 patients in day procedure facilities. Aggregate rates for the five indicators in 1997 were: failure to arrive, 1.5%; cancellation of procedure after arrival, 0.9%; unplanned return to operating room, 0.08% and unplanned delayed discharge, 0.56%. The unplanned overnight admission rate was significantly lower in freestanding than in attached facilities and significantly lower rates were noted for private compared with public facilities for all the indicators. Numerous actions were reported by 64% of organisations (as a result of indicator monitoring) including increased patient education, the production of information leaflets, establishment of pre-anaesthetic clinics, alteration of surgical techniques, introduction of drug trials and numerous policy changes.

Keywords: Clinical indicators; Day procedures; Quality database

1. Introduction

In 1995 Ira Rutkow wrote that 'ambulatory surgery is one of those rare socio-economic political movements in which all participants have benefited as demonstrated by public interest and demand, surgeon satisfaction, patient participation and most importantly, payer encouragement and mandate' [1]. However, there is no mention of quality in this statement and as the number, variety and complexity of day procedures increase it is clearly important to ensure the maintenance (and improvement) of the quality of care given. This issue has been addressed by the Australian Day Surgery Council (ADSC) and the Australian Council on Healthcare Standards (ACHS) Care Evaluation Program (CEP) in the development and implementation of a set of performance measures or clinical indicators [2]. They now form part of the larger program of the ACHS CEP and the medical colleges which has seen the introduction of 15 sets of clinical indicators into the Evaluation and Quality Improvement Program (EQuIP), the new accreditation process of the ACHS [3]. This has enabled the establishment of a 'national' database reflecting the quality of medical care. It is unique in its provider (medical college) involvement and the wide range of conditions and procedures addressed [4].

Clinical indicators are defined as measures of the management and/or outcome of care whose purpose is to act as flags of possible problems in patient care.

2. Clinical indicators for day procedures

Five generic indicators have been developed reflecting access and efficiency of booking, appropriateness of patient selection, safety of anaesthesia and surgery and discharge planning. They are:

- Failure of booked patients to arrive
- Cancellation of the procedure after arrival
- Unplanned return to the operating room
- Unplanned overnight admission
- Unplanned delay in discharge greater than 6 h.

The indicators were introduced in 1996 for health care organisations undergoing an accreditation survey

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Table 1
Aggregate results for all indicators

Indicator	No. of Orgs	Num.	Denom.	Rate (%)
Failure to arrive (FTA)	191	4876	317 416	1.5
Cancellation of procedure after arrival (CAA)	190	2850	314 365	0.9
Unplanned return to O.R. (UpROR)	193	268	333 569	0.08
Unplanned overnight admission (UpO/NA)	226	8520	384 401	2.2
Unplanned delay in patient discharge (DD)	170	1492	268 446	0.56

in that year and were addressed by 101 organisations. From January 1997 all health care organisations in the EQuIP program were requested to forward data 6-monthly to the CEP. In that year 240 organisations forwarded data and 54 of these were free standing facilities. The data received reflected the management of over 380 000 patients in day procedure facilities.

Compared with other indicator sets there was less reliance on the medical record, with more than 60% of facilities using prospective data collection methods utilising computerised programs and special forms. Nearly one in 10 facilities reported some difficulty in obtaining data for the 'failure to arrive' indicator, but little difficulty collecting data for the other indicators was experienced. In the development phase an indicator concerning admission to hospital after 24 h was field tested but later dropped as data proved too difficult to collect, particularly as there is no Australian unique identifier for patients.

Health care organisations forward both qualitative and quantitative data to the CEP, but no individual patient information is reported. The results from 240 organisations in 1997 are shown in Table 1. Comparisons of the indicators by public and private and free-standing or attached units are shown in Tables 2 and 3.

The rate of unplanned overnight admissions was 2.2%. In the context of day surgery this is probably the most important indicator. It was addressed by 226 organisations with a denominator of over 384 000 patients. A review of published studies reveals a mean rate of approximately 2.5% where all procedures are included [5–10] as with this indicator, but up to 9% for specific procedures such as laparoscopic cholecystectomy and some urological procedures [11,12].

A comparison of public versus private facilities revealed significantly lower values in private facilities for all of the indicators, as shown in Table 2. This may be reflecting a casemix difference.

The rates in free standing facilities for three of the indicators were significantly lower than in attached units but not for failure to arrive or unplanned return to the operating room, as shown in Table 3.

Of particular interest is the difference in the unplanned overnight admissions, which is seven times higher for attached units than for free standing day procedure centres. Possible factors accounting for this difference are the type of procedure performed in the attached facilities such as invasive radiology, the convenience of simply transferring a patient 'next door' and a difference in patient selection which perhaps is a little less rigorous than for free standing facilities. There may also be a difference in quality but this is doubtful. For 1997 the rate of unplanned return to the operating room for day procedures versus the hospital wide medical indicator (involving inpatients) reflects the same seven fold difference (0.08 vs. 0.56%, respectively) and is probably also a reflection of procedures performed and case complexity.

3. Validity of clinical indicator data

The CEP exercises no control over or direction on the methods for data collection used by the participating health care organisations. However, being provider developed the indicators have face validity and content validity in that they measure performance in aspects of care identified by the medical colleges as directly relevant to quality. As the number of contributing organisations increases, variation by any one organisation has less influence on the aggregate rate and therefore the accuracy (reliability) of the rate, as a measure of current practice, increases. A further reassurance of reliability is accord with the international literature, as was indicated above for the rate of unplanned transfers of patients to an overnight facility. Reproducibility has been clearly demonstrated in each year's data for other sets of indicators [13] and also for day procedures. For example the rates of unplanned return to the operating

Table 2
Public and private comparisons

Indicator	Public rate (%)	Private rate (%)	*P*-value
FTA	2.3	1	0.0001
CAA	1.8	0.3	0.0001
Up ROR	0.14	0.05	0.0001
Up O/NA	3.3	1.16	0.0001
Unplanned DD	0.89	0.38	0.0001

Table 3
Freestanding versus attached units

Indicator	Free standing rate (%)	Attached unit rate %	*P*-value
FTA	1.4	1.6	0.05
CAA	0.3	1.1	0.0001
Up ROR	0.05	0.09	0.1
Up O/NA	0.4	2.7	0.0001
Unplanned DD	0.18	0.66	0.0002

room were 0.05% in 1996 and 0.08% in 1997. The rates for unplanned delay in patient discharge were 0.46% in 1996 and 0.56% in 1997. As organisations move more to prospective data collection, using special registers, fewer errors are likely and whilst the whole program remains an educational one (without funding implications), to stimulate 'internal' review, there is little incentive for 'gaming' of data.

4. Responsiveness of the clinical indicators

Kazandjian and co workers in the Maryland program of indicators have commented that the 'responsiveness' of an indicator, that is its ability to induce action in facilities monitoring the indicator, is the best index of its value [14]. It was pleasing to note that 64% of the facilities monitoring these indicators took some action after reviewing their results.

The types of action taken related to: patient education, e.g. advice about fasting and cessation of certain drugs; information leaflets, e.g. explanations of procedures and follow up requirements; the establishment of pre-admission clinics; alteration to surgical techniques; a review of the type of procedures, e.g. ERCP was dropped by one facility as a day procedure; alteration to the order of procedures, e.g. procedures requiring a long recovery period were listed in the morning; alteration to drug policies–numerous policy changes were reported and a number of drug trials were initiated.

As with the other indicator sets the ACHS CEP and ADSC working party for these indicators will review the qualitative and quantitative information on a yearly basis and make appropriate changes to the indicators on a biennial basis. Consideration will be given to the introduction of specific procedure indicators in the future, for example laparoscopic procedures. Specificity will better enable 'peer' comparisons but it will be desirable to capture post discharge events to ensure more complete outcome information.

5. Conclusion

There has been good facility acceptance of the indicators. The overall standards of care as reflected by the indicators appear to be satisfactory, with free standing facilities in particular performing well. The indicators have proven to be responsive and as a result there is documented improvement in patient management. We can, in time, expect improvement in outcomes to be documented.

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ELSEVIER

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Ambulatory Surgery

Experience in integral management of advanced carpal tunnel syndrome in an ambulatory surgical unit

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Abstract

Experience in the integral management of carpal tunnel syndrome over a period of 4 years is presented. All cases were treated at an ambulatory surgical unit. Among this series, special attention is payed to eight cases of severe advanced carpal tunnel syndrome. All cases presented in this study had at the time of evaluation at the ambulatory surgical unit, symptoms of severe pain, thenar atrophy, weakness and decreased sensation. The only treatment received by some patients in this series ($n = 7$), before admission at the ambulatory surgical unit, was conservative therapy, with splinting, anti-inflammatory drugs and corticosteroid infiltrations. In one case, the patient had rejected all therapeutic options and no therapy had been undertaken at the time of first clinical evaluation. Several surgical findings were found in five of the eight cases of severe carpal tunnel syndrome: Basal joint arthritis of the thumb in three patients; A ganglion in another case; A flexor tendon synovitis in another. The diagnostic procedures, the indications for surgery and the postoperative results kin such advanced carpal tunnel syndrome are analyzed and discussed.

Keywords: Severe carpal tunnel syndrome; Clinical findings; Surgical findings; Nerve conduction studies; Outpatient surgery

1. Introduction

Carpal tunnel syndrome is the most common compressive neuropathy of the upper extremity. Nonoperative treatment may relieve symptoms temporarily, but most patients require a surgical decompression [1]. In these cases the use of the integral management procedures in a 1-day regimen surgery, offers benefits both to patients and health care institutions [2].

The causes of carpal tunnel syndrome may be multifactorial. These may include coexisting metabolic disorders, systemic neuropathies, more proximal lesions of the median nerve, local inflammation, and several anatomic peculiarities. It is important to seek an underlying disease, for instance a generalized metabolic disorder, because its treatment could relieve the carpal tunnel syndrome without surgery. Conversely, misdiagnosing an associated condition may yield an unsatisfactory result of a transverse carpal ligament division [3].

Clinical and electromyographic improvement has been demonstrated for the average patient with carpal tunnel syndrome [4,5]. However, these study groups have been heterogeneous with respect to their severity. Once a patient has progressed to severe thenar atrophy, sensory loss, pain unobtainable median sensory-evoked response, and unobtainable or severely prolonged median motor distal latency, the prognosis for surgical decompression has been shown to be uncertain [6,7].

This report describes the results of preoperative and postoperative clinical examinations and nerve-conduction studies in eight patients with severe, advanced carpal tunnel syndrome. Other purpose of this report was to examine the coexistence of other clinical entities such as basal joint osteoarthritis of the thumb. This allows us to provide patients more information about their prognosis after surgical release of a severe compressing neuropathy.

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2. Material and methods

The patients were first evaluated in an outpatient setting, where the surgical and anaesthetic selection was made. Complete oral and written information was given about the particulars of the process. Informed consent was obtained, and the relevant preoperative tests carried out.

During a period of 4 years from January 1994 to December 1997, eight patients underwent carpal tunnel release for advanced carpal tunnel syndrome. The criteria for inclusion in this study were an unobtainable median sensory-evoked response and absent or prolonged median motor distal latency. These patients also had symptoms that included pain, diminished strength, and decreased sensation. There were six women and two men in the group. The average age was 64 years (range, 54–79 years).

The preoperative anaesthetic status was ASA II in seven patients and compensated ASA III in one patient.

The patients were questioned about symptoms of pain, diminished strength, and decreased sensation. These symptoms were graded as none = 0, moderate = 1, or severe = 2. Physical examination before and after surgery included Phalen's test, Tinnel's sign, static two-point discrimination, and assessment of thenar muscle atrophy (Table 1).

A timed Phalen's test was positive if paresthesia was present in the median nerve distribution in less than 60 s. A Tinnel's sign was positive if paresthesia was present in the median nerve distribution with percussion at the wrist. Thenar atrophy was graded as present or absent.

Brachial plexus block with axillary approach was the anaesthetic technique used for all cases.

Surgery was performed under ischaemia of the extremity and magnifying glasses (2.5 ×) were used.

All patients in the study underwent division of the transverse carpal ligament through a standard palmar incision. None of the patients had internal neurolysis. All patients were immobilized with plaster cast for 2 weeks postoperatively. The median follow-up was 15 months from surgery, with a range of 7–24 months.

The surgical findings were basal joint osteoarthritis in three cases, and the reconstructing procedure was thumb arthroplasty, and carpal tunnel release at the same time. One case of tenosynovitis due to rheumatoid arthritis needed flexor tendon tenosynovectomy, and ganglion extirpation was performed in another. In the remaining three cases without clear clinical findings, only a neurolysis procedure was undertaken (Table 2).

Nerve conduction studies were made before and after surgery in all patients. Preoperatively, all patients had an absence of median sensory-evoked response. Median motor distal latency was absent in one patient and prolonged in the rest. Before surgery, the possibility of an opposition transfer was discussed with patients but all of them rejected this procedure.

Table 1
Clinical findings–preoperative evaluation[a]

Patient/sex/age/hand	Evolution (months)	Thenar Atrophy	Pain	Weakness	Decreased sensation	Static two-point discrimination (mm)	Phallen	Tinnel
1/W/58/R	29	+	2	1	1	9	+	−
2/W/66/R	34	+	1	2	2	10	+	+
3/W/70/L	41	+	1	2	2	>15	+	+
4/M/68/L	30	+	1	1	1	10	+	+
5/W/54/R	14	+	2	1	1	8	+	+
6/W/79/L	46	+	1	3	2	>20	+	+
7/W/49/R	18	+	2	1	1	>10	+	+
8/M/69/L	32	+	1	2	2	>15	+	+

[a] Normal values of static two-point discrimination. Positive result if failure to discriminate points more than 6 mm apart [17].

Table 2
Surgery undertaken for carpal tunnel syndrome with intraroperative findings, and clinical follow-up

Patient/sex/age/hand	Surgery	Causes	Follow-up (months)
1/W/58/R	Neurolysis + thumb arthroplasty	Primary thumb osteoarthritis	8
2/W/66/R	Neurolysis + thumb	Primary thumb osteoarthritis	24
3/W/70/L	Neurolysis + tumor excision	Ganglion	18
4/M/68/L	Neurolysis	Not clear	7
5/W/54/R	Neurolysis + thumb arthroplasty	Primary thumb osteoarthritis	10
6/W/79/L	Neurolysis	Not clear	21
7/W/49/R	Neurolysis + flexor tenosinovectomy	Inflammatory systemic disease	15
8/M/69/L	Neurolysis	Not clear	16

Table 3
Clinical findings–postoperative evaluation[a]

Patient/sex/age/hand	Evolution (months)	Thenar atrophy	Pain	Weakness	Decreased sensation	Static two-point discrimination (mm)	Phalen	Tinnel
1/W/58/R	8	−	0	1	0	5	−	−
2/W/66/R	24	+	0	2	1	8	−	−
3/W/70/L	18	+	0	2	1	10	−	−
4/M/68/L	7	−	0	1	1	5	−	−
5/W/54/R	10	−	0	0	1	5	−	−
6/W/79/L	21	+	0	2	2	15	+	−
7/W/49/R	15	−	1	1	1	7	−	−
8/M/69/L	6	+	0	2	1	10	−	−

[a] Normal values of static two-point discrimination. Positive result if failure to discriminate points more than 6 mm apart [17].

There were no serious complications related to surgery, but hospital admission was necessary for two days in one case, because of nausea and vomiting related to anaesthesia.

Finally, patient satisfaction was assessed using the same questionnaire, that is standard in the patient surgical unit.

2.1. Clinical results

All patients improved after surgery. Only one had residual pain after surgery. Six of eight patients reported a decrease in their sense of weakness during daily activities (Table 3).

Five cases had a complete resolution of their numbness, two had a partial resolution, and two patients reported no improvement. All patients had a decrease in at least two of the three symptoms of pain, weakness, or numbness. There were no complete failures of symptomatic improvement.

Preoperatively, the Phalen's test was positive in all cases. After surgery, it remained positive in only one patient. Preoperatively, seven of eight patients had a positive Tinnel's sign at the wrist, which was negative in all patients after surgery.

Static two-point discrimination was 10 mm of greater in six cases, and all cases showed improvement.

Presence or absence of thenar atrophy was chosen as a criterion because of the lack of an objective method to grade partial improvement in the bulk of thenar muscles. Thenar atrophy was present in all cases preoperatively. At the time of follow-up, four patients had no evidence of thenar atrophy. In three cases patients reported that their hands felt stronger after surgery.

2.2. Results of nerve-conduction study

Preoperatively, all patients had unobtainable median nerve sensory distal latencies. One patient had unobtainable median motor distal latencies.

Table 4
Electrodiagnostic study-preoperative evaluation [a,b].

Patient/sex/age/hand	Motor latency (ms)	Sensory latency (ms)
1/W/58/R	9.5	Unobtainable
2/W/66/R	7.5	Unobtainable
3/W/70/L	8.4	Unobtainable
4/M/68/L	12.1	Unobtainable
5/W/54/R	16.4	Unobtainable
6/W/79/L	7.2	Unobtainable
7/W/49/R	5.5	Unobtainable
8/M/69/L	Unobtainable	Unobtainable

[a] Normal values of the distal sensory latency and conduction velocity. Positive result if latency greater than 3.5 mm/s or asymmetry of conduction velocity greater than 0.5 mm/s versus contralateral hand [17].

[b] Normal values of the distal motor latency and conduction velocity. Positive result if latency greater than 4.5 mm/s or asymmetry of conduction velocity greater than 1.0 mm/s [17].

All the others had prolonged median motor distal latencies ranging from 5.5 to 16.4 ms.

Table 5
Electrodiagnostic study—postoperative evaluation[a,b]

Patient/Sex/Age/Hand	Motor latency (ms)	Sensory latency (ms)
1/W/58/R	4.8	Unobtainable
2/W/66/R	56	5.2
3/W/70/L	5.1	4.6
4/M/68/L	6.9	3.5
5/W/54/R	5.2	3.9
6/W/79/L	4.8	3.5
7/W/49/R	3.9	4.4
8/M/69/L	4.8	2.7

[a] Normal values of the distal sensory latency and conduction velocity. Positive result if latency greater than 3.5 mm/s or asymmetry of conduction velocity greater than 0.5 mm/s versus contralateral hand [17].

[b] Normal values of the distal motor latency and conduction velocity. Positive result if latency greater than 4.5 mm/s or asymmetry of conduction velocity greater than 1.0 mm/s [17].

All patients had improvement in median motor distal latency. In all patients postoperatively distal latencies were better than the preoperative values (Tables 4 and 5). All patients except one showed electromyographic improvement in the abductor pollicis brevis muscle.

The only patient (case no 1) who had no improvement in sensory distal latency with carpal tunnel release had symptomatic improvement and was satisfied with the surgical result.

3. Discussion

According to other authors the preferred anaesthetic technique used for this outpatient surgical procedures was brachial plexus block with axillary approach [8,9]. We have applied this technique to all our patients, with a high success rate. Previous studies have reported that advancing age has a detrimental effect on nerve regeneration [10]. The findings in this study suggest but do not prove a correlation. It is also possible that other factors, such as degenerative arthritis of the basal joint or general loss of muscle bulk with advancing age, could contribute to real or apparent thenar atrophy in these cases.

While coexistence of carpal tunnel syndrome and basal joint arthritis of the thumb has been described by multiple authors [11], it has been stressed by only a few. Burton noted that coexistence was common [12]. He warned that unrecognized carpal tunnel syndrome could result in persisting post-operative pain and significant weakness and could even precipitate a reflex sympathetic dystrophy.

Other authors such Melone [13], and Florack [14] also stressed the coexistence of these two processes, but reasons behind their relationship was not clear. It is possible that thenar weakness secondary to carpal tunnel syndrome could play a role in the deterioration of the basal joint in some patients [14].

In our series, three cases out of eight had, at the time of their surgical procedure, basal joint osteoarthritis of the thumb, and reconstructive procedures (arthroplasty) were necessary.

Flexor tendon synovitis is a common finding at the time of carpal tunnel surgery [15]. This synovitis may be a contributing cause of the carpal tunnel syndrome, but it may also represent a reaction of the flexor tendons to a tight carpal tunnel. Only in one case out of eight, a flexor tendon tenosynovectomy was undertaken for an advanced carpal tunnel syndrome with a concomitant inflammatory systemic disease. Routine synovectomy is not recommended as an adjunct to the division of the carpal ligament. It is only appropriate in cases of rheumatoid arthritis [16].

The median motor distal latency improved to a normal range in nearly the half of the hands. The greatest improvement in distal latency was seen in those hands in which it was most prolonged preoperatively.

The sensory response returned in all cases except in one.

The results showed that a high percentage of these patients had improvement in their electrophysiologic parameters and excellent symptomatic relief after decompression of the carpal tunnel. Long-standing symptoms, thenar atrophy, virtual anesthesia, and the absence of demostrable sensory and motor evoked responses are not contraindications for surgery [17].

The evaluation of the entire procedure, diagnostic and therapeutic has demonstrated a high degree of satisfaction in the patient population.

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Abstract

Literature review for National Guidelines on discharge planning and criteria for day surgery

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1. Introduction

The Day Surgery Council of Australia requested the Australian Day Surgery Nurses Association's assistance in formulating National Guidelines for discharge planning and criteria. After discussion at the Australian Day Surgery Nurses Association meeting, it was decided that a working party would undertake a literature review. The results of this review are presented. The literature was sourced from the UK and USA, as there are very few Australian publications available.

Part one of this paper presents published data on clinical criteria for discharge planning. The purpose of the guideline is to choose a tool for safe discharge from second stage recovery. Part two presents a review of the behavioural and educational component of the proposed guideline. In part two, we examine the educational needs necessary to provide knowledge, skills and attitudes for the patient and carer to facilitate favourable post-discharge outcomes.

2. Approach

A model flowchart for developing guidelines is presented in Appendix A.

3. Aim

To review the literature to develop a guideline for patient outcomes that will provide a minimum baseline for each facility to benchmark their practice of discharge planning and criteria for patients undergoing day surgery.

4. The current situation

There is currently no uniformity for measurement of discharge planning practices. This impacts on patient outcomes and results in variability in measures that do not allow for comparison or facilitate the collection of numerical data. Discharge practices vary according to budget and facility preference, i.e.

- stable observations vary from 0 to 3 h;
- measurement of the return to normal function and the ability to eat, drink and void varies;
- there are different measurements for balance. co-ordination and comprehension;
- variance in expected levels of post-operative nausea and vomiting;
- varying perceptions of post-procedural complications;
- varying range in post-discharge information and essential quality of support persons;
- varying distances travelled and suitability of available transport.

5. Part one

5.1. Options for discharge criteria

Marley and Moline state that 'Each facility must establish a written protocol for patient discharge. The process should include specific discharge criteria to determine whether the patient is ready to be discharged, to promote quality care, and to provide a foundation for practice decisions. It is important that these institutional discharge policies be well documented and uniformly employed' [1].

Chung states that 'As patients presenting for ambulatory surgery become more complex and compromised, and their surgical treatment more demanding, it is important to replace, or at least supplement, our existing qualitative, subjective method for evaluating patient discharge with a quantitative, objective technique to provide a simple and consistent method of determining home readiness' [2].

5.2. Option 1. Guidelines for safe discharge after ambulatory surgery [3]

1. Vital signs must have been stable for at least 1 h.
2. The patient must be:
   - oriented to person, place and time;
   - able to retain orally administered fluids;
   - able to void;
   - able to dress;
   - able to walk without assistance.
3. The patient must not have:
   - more than minimal nausea and vomiting;
   - excessive pain;
   - bleeding.
4. The patient must be discharged by both the person who administered anaesthesia and the person who performed the surgery, or

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by their designates. Written instructions for the post-operative period at home, including a contact place and person, need to be reinforced.
5. The patient must have a responsible 'vested' adult escort them home and stay with them at home.

Chung states that 'by documenting patient progress using a scoring system, we can estimate the time of home readiness of individual patients undergoing different surgical procedures and different anaesthetic techniques' [2].

This criterion appears vague and open to individual interpretation. It does not provide the simplicity of a scoring system to facilitate fast and easy documentation.

5.3. Option 2. Essential and desirable discharge criteria [4] (Table 1)

There is no documentation as to specific level of a recovery attained prior to discharge. Again, this option appears vague and open to varying individual interpretations and is not readily quantifiable for statistics. Also, there is not the convenience of a scoring system for straightforward documentation.

5.4. Option 3. Post-anaesthesia discharge scoring system (PADSS)

1. Vital signs:
   2 = within 20% of preoperative value;
   1 = 20–40% of preoperative value;
   0 = 40% of preoperative value.
2. Ambulation and mental status:
   2 = oriented × 3 and has a steady gait;
   1 = oriented × 3 or has a steady gait;
   0 = neither.
3. Pain, or nausea/vomiting:
   2 = minimal;
   1 = moderate;
   0 = severe.
4. Surgical bleeding:
   2 = minimal;
   1 = moderate;
   0 = severe.
5. Intake and output:
   2 = has had PO fluids and voided;
   1 = has had PO fluids or voided;
   0 = neither.

The total score is 10. Patients scoring 9 or 10 are considered fit for discharge home [3].

Chung states that 'the ability to tolerate oral fluids remains controversial as a clinical criterion for discharge. The decision to discharge patients should be based on a number of factors such as: age, medical condition, distance from home, availability of a responsible adult, state of hydration, and anticipation of whether or not the patient is likely to suffer any complications if fluids are not taken on the day of surgery. Schreiner et al. found that paediatric patients required to drink before the hospital discharge had an increased incidence of vomiting and prolonged hospital stay. 6,000 children were discharged after surgery from the children's hospital of Philadelphia without oral intake. Only three patients required admission for vomiting and one readmission from home for intractable vomiting and dehydration. These findings suggest that oral fluid intake may not be a necessary criterion for discharge. A patient cannot be discharged home if actively vomiting, but it is undesirable to continue to administer oral fluids' [2].

5.5. Option 4. Modified PADSS

1. Vital signs:
   2 = within 20% of preoperative value;
   1 = 20–40% of preoperative value;
   0 = > 40% of preoperative value.
2. Ambulation:
   2 = steady gait, no dizziness;
   1 = with assistance;
   0 = none, dizziness.
3. Nausea/vomiting:
   2 = minimal;
   1 = moderate;
   0 = severe.
4. Pain:
   2 = minimal;
   1 = moderate;
   0 = severe.
5. Surgical bleeding:
   2 = minimal;
   1 = moderate;
   0 = severe.

The total score is 10. Patients scoring 9 or 10 are considered fit for discharge home [3].

Chung states that 'a study conducted at the Medical College of Virginia found that 86% of patients were discharged sooner using PADSS than Clinical Discharge Criteria ie. Options 1 and 2. In the remaining 14% of patients, Clinical Discharge Criteria were satisfied sooner because failure to void was required by PADSS but optional in the clinical criteria. If voiding is not included among the criteria for discharge, the patient must be fully informed about his or her role, when to call a physician, or when to return to the facility.'

Chung goes on to say 'We found that more patients (approximately 20%) could be discharged home early using the modified scoring system. However, follow-up studies are required to evaluate the short and long term effects on recovery of eliminating these criteria' [2].

Table 1
Essential and desirable discharge criteria

Category	Essential	Desirable
Mental state	Alert and responsive	Feels clear headed
Mobility	Able to mobilize to pre-operative level within constraints of surgery with no dizziness	
Pain	Has been given appropriate prescribed oral analgesics for pain	No/minimal pain
Eating and drinking	Tolerating oral fluids	Tolerated tea and toast, no nausea or vomiting
Elimination		Passed urine
Information	Verbal explanation of pain management, wound care, driving, alcohol intake, the next 24 h, operation specific information as necessary, whom to contact in an emergency	Written material on same
Social factors	Patient ready to be discharged into care of responsible adult	Further support at home

6. Part two

6.1. Discharge planning

For discharge planning to be successful, it must include written protocols for the appropriate support person, patient information and telephone follow-up calls.

Twersky states that 'Each facility must develop policies and procedures regarding discharge criteria and initiate the responsibility for discharging patients at home from the ambulatory surgery unit. This includes evaluation and an examination of the patient by the physician or the application of rigorously accepted discharge criteria if a physician does not perform this evaluation. In addition, the patient must be given written postoperative instructions with information about where to seek emergency medical assistance including phone numbers of the surgeon, ambulatory surgical unit, and the nearest emergency room. Patients should be cautioned about performing functions that require a complete recovery of cognitive ability. Proper adherence to these discharge criteria and documentation protect against premature discharge of patients with the potential for unanticipated hospital admission, return for emergency care, postoperative complications or legal repercussions' [5]

6.2. Support person

Marley and Moline state that 'a responsible adult is considered to be any willing individual who is physically and intellectually capable of caring for the patient. The role of a responsible adult is to 1) assist with activities of daily living as needed, 2) assure compliance with postoperative instructions. and 3) monitor the patient's progress towards recovery' [1].

Rudkin states that 'this term can be interpreted and applied in various ways. Each unit must have its own policies and criteria, together with the direction for staff. Our ''responsible'' carer is a competent (i.e. not mentally handicapped) person over 16 years of age that is physically able.

Issues to address are as follows.

- Who judges the acceptability of the responsible adult?
- What control does day surgery staff have over patient activities after discharge?
- Should a patient be allowed to leave if staff know that the Guardian will not stay with the patient at home?
- Where do liability and responsibility lie when suspected unacceptable home circumstances exist?' [6]

Individual facilities must consider some of these characteristics when providing written protocols that give direction to staff to follow when discharging clients.

Where appropriate, the following are further considerations individual units must make depending on types of surgery and geographical considerations.

- Rudkin states 'Nearly 40% of ambulatory surgical patients report return to normal activities the day after surgery. Assistance may be necessary for up to 48 hours, especially in elderly patients' [1].
- Marshall et al. also state that 'the current recommendations are that patients who have had an anaesthetic lasting less than 60 minutes should not drive for 24 hours whereas patients who have had longer procedures should be advised against driving for 48 hours' [3].
- Marley and Moline state that 'A review of the ambulatory surgical care encompassing 45.090 patients during a three year period at a rural based referral centre found most major postoperative morbidities (1:1,455) occur within the first 48 hours, whereas no deaths occurred during the first week post surgery' [1].
- Another point Marshall et al. makes is 'Modern general anaesthetic agents allow for rapid recovery and early discharge from the ambulatory units, however recovery may be more rapid if General anaesthetics are avoided and patients are given a regional block. Following discharge, patients need to be followed up appropriately and given specific written guidelines on referral procedures in the event of complications. Pain is a problem in the post discharge period, and consideration should be given to providing adequate analgesia. Patients should be advised against driving for 24 to 48 hours depending on the duration of the procedure' [3].
- Rudkin states that 'Patients can suffer complications following discharge from day surgery, such as haemorrhage, uncontrollable pain, vomiting and syncope. It is therefore recommended that patients should travel for no longer than one hour. Contact telephone numbers of the surgeon, the facility and the after hours numbers should all be provided' [1].

6.3. Follow-up phone calls

Rudkin states 'There are significant advantages in contacting day surgery patients following their surgery. For the patient this provides an opportunity for continuity of care, and for the staff it is a means of patient feedback of the care provided. Staff should ask appropriate day surgery questions and open-ended questions pertaining to the surgery performed, allowing the patient to provide valuable comments' [6].

Lancaster states that 'Patients should receive a postoperative phone call the next business day to follow up on their physical condition and emotional state. The nurse typically queries the patient about bleeding, pain, effectiveness of medication, nausea and vomiting and fluid intake and output. When problems are detected within the scope of the nurse's practice, the nurse offers advice and support, which is then documented in the patient's medical record. The postoperative phone call is also an excellent opportunity for the patient and family to ask any lingering questions about the initial recovery period at home. Sometimes the patient or family expresses their perceptions of care during the period of contact, both positive and negative. The nurse should be especially receptive to voiced concerns, because trends in care can be detected over short periods of time and can offer opportunities for improvement' [7].

Hawkshaw conducted a survey in 1994, which demonstrated that 'A nurse should carry out the patient follow-up, not least because of his or her inherent knowledge of the procedure the patient has endured and the subsequent pain, symptoms and possible complications. Telephone contact with patients provide immediate information of how the systems that operate in the hospital appeared to conspire against patient satisfaction' [8].

These statements are supported by strong bibliographical evidence and present a strong indication for consideration in individual facilities' work practices.

6.4. Patient information and education

The four articles used in this discussion paper are based on research surveys on patient understanding and satisfaction, which have been conducted over the past 4 years.

Moran states 'at post discharge interview, the benefits of having printed information for support and advice were obvious, with patients and carers reporting frequent referral to the leaflets' [9].

Oberle et al. found that 'Many patients expressed a desire for more written information, both behavioural and sensory to which they could refer when the time arrived. It was important to patients that written material be in layman's language because many patients had difficulty understanding the medical jargon. It is also noteworthy that most patients (54%) did not realise that nurses were responsible for their perioperative teaching in any way. This is particularly interesting insofar as half the role of nurses in our same day surgery unit includes a large teaching component. One explanation may be that when nurses teach, patients do not interpret such information sharing as teaching per se. It may be important for nurses to signal their

intent to teach before providing information; this could alert the patient to listen more closely to the nurse's words, and therefore it could enhance the learning experience. We conclude from this study that the most important information to teach patients is how to cope with pain and fatigue and what to expect during the postoperative course. Patients require guidelines against which they can gauge their progress' [10].

Brumfield et al. found that 'When patients are well informed, they are more likely to experience positive outcomes and increased satisfaction with their care' [11].

The importance of individualised teaching content for each patient includes identifying individual characteristics that influence their educational needs. This is an important nursing concern. Standardised teaching packages may not be effective because they do not address patient's individual needs.

Previous researchers identified five dimensions of pre-operative teaching. These dimensions were psychosocial support (i.e. reassurance geared towards reducing anxiety), skills training (i.e. teaching skills such as deep breathing), situational information (i.e. events and experiences patients would undergo), sensation discomfort information (i.e. descriptions of what the patient would feel), and patient role information (i.e. expected patient behaviour).

Most patients believed that they should be taught about post-operative nursing care before admission, whereas the nurses preferred to wait until patients were admitted to impart this information. Most patients preferred to wait until after admission to learn new skills to prevent complications. Very few nurses and patients preferred to either teach or learn new knowledge at the time surgical procedures were being performed.

One alternative is to improve communication between staff members in surgeons' offices and hospital pre-admission nurses. Another option is to develop structured teaching materials (e.g. video tapes, pamphlets, on site visits by hospital staff members) that are appropriate for ambulatory surgery patients, are specific to the institutions involved, and supplement verbal teaching [11].

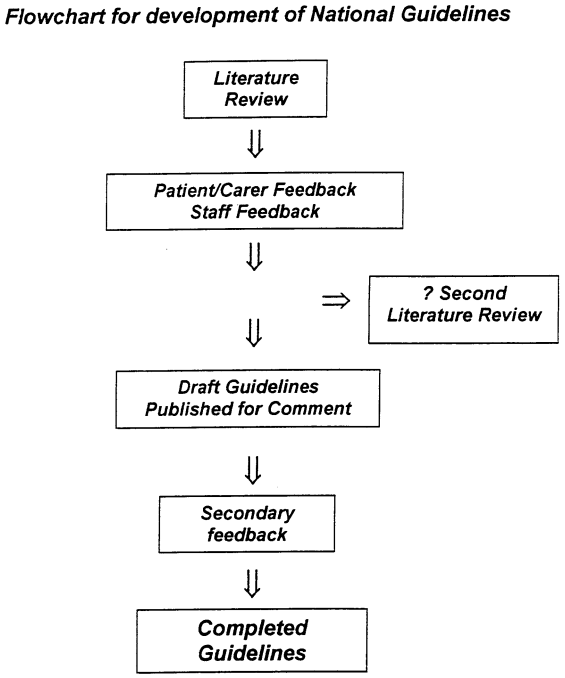
7. Conclusion

Part one of this paper examines the clinical outcome with discharge options, which have been presented in articles so that an informed choice of what adapts best to each day surgery situation may be made. The first two options offer only clinical indicators, which are not specific in their parameters. Options 3 and 4 offer a scoring system, which is both convenient for documentation and shows specifically the patient's level of recovery prior to discharge. The distinct difference between Options 3 and 4 is whether your patient is required to have oral intake and void prior to discharge. One article was found to support the theory of not requiring oral intake. Voiding was found only to be necessary post-operatively in genitourinary cases and Option 4 can have this added underneath.

Part two of this paper examines the behavioural and attitudinal outcomes, which impact on discharge planning, support person, follow-up phone calls and patient information and education. The literature suggests each unit have clear protocols and policies on what are the specific acceptable parameters for each of these factors. The Day Surgery Nurse may then apply these as a guideline in her decision-making process of her patient's readiness for discharge and, having followed written guidelines, is covered legally in the event of an incident or query of care given.

From these articles, we must assess what recommendations should be made to establish minimal discharge planning and criteria guidelines that will suit the small private day surgery provider through to the largest hospital based day surgery provider. These guidelines will provide an indication of standard acceptable care for day surgery patients from which individual units can develop policies and practice guidelines which support their own service.

Appendix A. Flowchart for development of National Guidelines



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