

Editorial

'The Future Today'

The First International Conference and Exhibition on Same-Day Surgery, held in Perth on 27–30 October 1993, highlighted the need for a forum on practical issues relating to day surgery. In all 350 delegates attended the conference, which set out to bring together a wide range of professionals working in day surgery as well as health managers, health planners and other related professionals from all over Australia, New Zealand, South-East Asia and further afield, in the first truly practical day surgery meeting concentrating on outcomes supported by data drawn from the USA, UK and Australia. The main objective of the conference was to focus on recent rapid developments in new technology and techniques which have already led to more major surgery being conducted on a same-day basis.

The conference acknowledged that more was needed to encourage the growth of day surgery in Australia, where it currently accounts for about 30% of all surgical procedures, to bring it more in line with countries such as the USA, where approximately 50% of all surgery is conducted on a same-day basis. This will entail altering the attitudes of health-industry workers (including doctors), educating patients to accept change, and lobbying federal and state governments to provide the right incentives. The need for such incentives was highlighted by Paul Gross, a health economist from New South Wales, who said that if all procedures currently being done on an inpatient basis were switched to day surgery facilities, there would be an instant 30% decrease in bed utilization, and the cost of private health insurance would be slashed by \$600 a year.

The conference was hosted by the Perth Surgicentre and endorsed by the Royal Australasian College of Surgeons, the Australian Association of Day Surgery Centres and the National Day Surgery Committee. Support was also received from the Royal Australian College of Ophthalmologists, the Australian and New Zealand College of Anaesthetists, the Royal Australian College of Obstetricians and Gynaecologists, the Commonwealth Department of Health, Housing and Community Services and the West Australian Department of Commerce and Trade.

Principal and major sponsors included Smith and Nephew Richards Pty Ltd, Medibank Private (national health fund), and the Health Department and Hospital Benefit Fund of Western Australia.

The conference opened with plenary sessions on international and Australian day surgery experiences, and an examination of cost considerations. The first day concluded with a look at patient management (preparation, complications, recovery, follow-up and the need to give patients more control), and issues concerning anaesthesia.

On day two there were concurrent sessions examining current practice, the application and results of new technology and techniques, and international developments in gynaecology/urology, general surgery, orthopaedics, ophthalmology and paediatric surgery, as well as issues relating to the operation of a day surgery unit, including health insurance perspectives, marketing initiatives, the design of day units, finance, technology assessment and quality control. These were broken by a plenary session on the impact of new technology on such areas as training, standards and medico-legal concerns.

On the final day, all the invited international speakers presented papers on future developments in their respective subspecialities in the same plenary session. Medical conferences are becoming by necessity so specialized that it was refreshing and fascinating for the audience to hear of future perspectives from such a variety of specialists on the same programme. This was particularly so for the surgeons listening to presentations from specialities other than their own, and clearly demonstrated to all present that the problems of standards, training and accreditation for minimal access procedures are common to different specialities worldwide. Many specialists are now rethinking the way they practise, as a direct result of the practical benefits of day surgery (economic and otherwise).

In response to the rapid developments in day surgery and the interest generated by the conference, the Australian Association of Day Surgery Centres – at its annual general meeting, held to coincide with the Perth conference – resolved to change its structure and

membership, as well as to rename the association, to become a representative organization for day surgery embracing free-standing and integrated hospital day units, public and private sectors, and metropolitan and country facilities. This will also include linking up with day surgery special-interest groups and bodies not only in Australia, but in other countries in South-East Asia.

Accelerated growth in day surgery in Australia is predicted, which will create even greater interest for the next international conference planned to take place in Melbourne in 1995.

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Future developments in day-case laparoscopic surgery

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Laparoscopic surgery is entering a phase of maturation and consolidation. Besides offering very early return of function after herniorrhaphy, the laparoscopic approach is likely to bring a large tranche of major abdominal surgery, such as cholecystectomy and some other upper gastrointestinal surgery, within the reach of day-case management. The length of stay of other major abdominal surgery will be reduced. There is likely to be a convergence between day-case and inpatient units, and laparoscopic surgery will become concentrated in relatively few centres.

Key words: Laparoscopic surgery, ambulatory surgery, future developments

Introduction

The introduction of the laparoscopic approach to major abdominal surgery is widely regarded as having been the most dramatic and far-reaching single development in general surgery in the professional lifetime of the present generation of surgeons. The first laparoscopic cholecystectomy was performed seven years ago. The extent of the subsequent development would have been inconceivable before then and this acts as a deterrent to any would-be soothsayer today! Nevertheless, it is possible to make some predictions for the short and medium terms, particularly as the rate of development is slowing somewhat as laparoscopic surgery enters a phase of consolidation and maturation. A more stable pattern of practice is beginning to emerge and the strengths and limitations of the techniques of laparoscopic surgery are becoming more apparent.

The two significant advantages that the laparoscopic approach to abdominal surgery confer are a reduction in pain and its associated morbidity and a reduction in postoperative ileus. The domination of the recovery from surgery by wound pain had previously been insufficiently appreciated by surgeons. The introduction of the laparoscopic approach to abdominal surgery has coincided with a significant thrust towards improved pain control throughout all reaches of surgery. However, the laparoscopic approach achieves a reduction in, rather than a

control of, pain and this avoids any disadvantages arising from the methods of pain control.

The reduction in hospital stay which a reduction in pain and ileus following surgery should allow is now becoming a reality. At the same time, some day-case units are developing '23 hour' facilities. Even inpatient units, of necessity, are beginning to acquire and exercise the skills and disciplines in case and bed management which have been learned by day-case units.

There is therefore a convergence in the reducing lengths of stay and clinical and bed management issues which may well make the distinction between day-case, '23 hour' or early discharge inpatient surgery less clearly defined. At the same time, the introduction of major abdominal surgery to the day-case environment will require the importation of the skills of managing this type of surgery currently exercised by inpatient units. In the context of this convergence, developments across a wide range of laparoscopic surgery may become relevant, particularly in their potential to shorten hospital stays, and will therefore be discussed.

Advancing human and technical resources

The laparoscopic approach to major surgery was enabled by the development of the 'chip' camera. The development of this type of surgery continues to be dependent on, and constrained by, developments in the technical devices used and the human abilities to use them. These together determine the types of surgery which can be attempted. Developments in televisual technology, instrumentation, the psychomotor skills of surgeons and the challenges of individual types of surgery will therefore be discussed in turn.

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Televsual technology

While the view afforded by modern laparoscopic cameras would have seemed remarkable a few years ago, there are still considerable restrictions on vision. Resolution and colour reference are not as good as that of the naked eye. The view remains, for the moment, monoscopic and it is coaxially lit. The angles of visual approach to the operative field are limited to port positions.

Angled or flexible telescopes allow a limited ability to 'see round corners', but problems for the operator arise when there are large angles between the visual axes in the monitor and the physical axes on the table (in which the instrument handles are manipulated). Rotational transformations are difficult to accommodate beyond 30°. Large angular transformations can be accommodated with time, but changing the angular transformation required frequently and within a short time span is difficult for the operator, particularly if the transformation is greater than 90°, so that the sense of the movement of instruments, as seen on the monitor, is reversed. The possible solutions to these problems will be discussed in turn.

Resolution, colour reference and three dimensions

The most important single characteristic of a televsual channel for the surgeon is its resolution. This far transcends any other characteristic, and resolution has improved rapidly in the last few years. The 'chip' camera produces a digital signal and this lends itself to computer image enhancement. It has become more sensitive to light, which has permitted a reduction in telescope aperture, with a consequent reduction in distortion and an improvement in depth of focus. High intensity light sources and solid glass optical pathways have contributed to this improvement. 'Three chip' cameras, where the light image is split three ways, for chips sensitive to red, green and blue light, improves colour reference and also resolution, but sometimes not to an extent sufficient to justify the increase in weight of the camera.

Within the next year, usable three dimensional systems will become available. Early systems divided the optical pathway, with a consequent reduction in resolution, but a recently developed system uses a single, full sized, internally reflecting telescope, with the two cameras looking, at an angle to each other, into the single telescope. Resolution almost equal to current monoscopic systems should be achievable. This system also projects the polarized images from a single screen continuously, which appears, at least to this author, to be superior to the alternative technique of projecting left and right images alternately, with the surgeon's right and left eyes being 'blacked out' alternately by liquid crystal diode (LCD) spectacles under infrared control.

High definition television is at last appearing in the market place. The improvement in resolution and colour reference is remarkable. Camera systems are still too heavy for practical use for laparoscopy, but their weight is reducing rapidly. The systems are also very expensive

and likely to remain so until their introduction into domestic markets allow for mass production to offset development costs.

For the future, one would hope to see wider angles of view without loss of resolution, and smaller chip cameras carried into the abdomen on articulated arms to liberate the surgeon from the present restrictions of port access.

Extended imaging

One of the restrictions of the laparoscopic approach is the limitation of feel. Other imaging modalities can, in part, compensate for this. High definition C-arm screening equipment is now becoming widely available. It is useful for cholangiography, but this technique requires cannulation of the biliary tree and is therefore invasive.

Laparoscopic ultrasonography is non-invasive and carries no biological penalty. The direct application of the transducer arrays to the point of interest allows high resolution to be achieved. It is useful, for example, for guiding dissection in difficult cholecystectomies. The equipment is, as yet, in its infancy. Becoming available shortly are steerable probes, bi-directional linear and phased arrays and colour Doppler.

Currently available computer technology would, in principle, allow integrated displays of visual data and data from other imaging modalities. The limitation will be the cost of what must be dedicated equipment coupled with the small size of the market.

Instruments

The laparoscopic televsual systems have benefited from the huge development market outside medicine. Instrumentation cannot share this benefit and laparoscopic instrumentation has lagged behind in comparison with the televsual systems. Quite simple developments – such as multifunctional systems which will allow simultaneous suction, irrigation or diathermy alongside scissors and graspers – are only just beginning to appear. This limited capability is holding back surgical development.

There are now instruments which can adopt a curve within the abdomen, in an attempt to escape from the restrictions of limited port access, but they are not yet truly articulated. Angling stapling devices are eagerly awaited. In some respects the restriction is one of cost. For example, dividing fat mesenteries remains a problem. It can easily be overcome by using several linear stapling and cutting devices, but the cost is prohibitive at present.

Scissors and diathermy remain the principal instruments for cutting and coagulation. Other modalities of tissue destruction and coagulation, such as lasers and ultrasonics, have been investigated. The pulse dye laser is useful for the destruction of inaccessible stones in the common bile duct and ultrasonic dissectors are useful for dissecting the liver. However, apart from limited applications, these modalities have proved disappointing so far.

The most exciting prospect in this field is the develop-

ment of micromanipulators and articulated arms. These are developing from the technology used for the manipulation of objects in dangerous environments. Advances in engineering allow small motors and gear trains to be constructed in the same way as, and integral with, the chips which are controlling them, decreasing size and cost and increasing reliability. Arms have been constructed which can sense resistance, thus preventing inadvertent damage to tissues. There are now sophisticated input devices, such as the electronically wired glove which can sense the position of the hand and fingers, transmit them to a manipulator and feed back the pressure with which an object is grasped.

It is possible to speculate that in the future multiple articulated arms and manipulators will be carried into the abdomen, accompanied by high definition three dimensional cameras, able to retract and to dissect on any axis and to mimic the movements of the surgeon's fingers. This will liberate the surgeon from the frustrations caused by the limitations of the present instruments and the restrictions of port access.

Surgeons

The introduction of laparoscopic surgery was greeted with enormous enthusiasm and there was a rush to acquire the basic techniques. These techniques required mature surgeons to acquire new psychomotor skills, needing abilities for which they had not been selected during their training and which were therefore possessed in varying degree. There was a learning curve and there were, largely anecdotal, reports of errors. Many of these reports were without a denominator and it is likely that in most instances the good sense, maturity and experience of trained surgeons protected patients from harm.

It is interesting to observe that, now the basic techniques have been acquired, there seems to be a reluctance to extend skills to cover the full armamentarium which would be considered necessary for the safe performance of open surgery. For example, among surgeons regularly performing laparoscopic cholecystectomy, relatively few are prepared to suture within the abdomen laparoscopically, or to explore the common bile duct. Advanced laparoscopic surgery is still restricted to relatively few institutions.

This factor is compounded by the current increase in subspecialization, so that specialist surgeons, such as the coloproctologist, may not have been exposed to cholecystectomy as a training ground. These two factors alone suggest that some current predictions of the proportion of abdominal surgery which will be performed via a laparoscopic approach within the next few years are optimistic.

It may be that the full development of the laparoscopic approach will not occur until a new generation of surgeons, selected and trained from the outset on laparoscopic techniques, have come to maturity. In training courses, it is very noticeable that younger surgeons, perhaps exposed to computer games from an early age,

often take to the techniques of laparoscopic surgery with far greater ease than their older colleagues.

While the development of sophisticated simulators is in its infancy, they are not required for the practice of most techniques, such as suturing. There is currently an insufficient culture of off-line practice in surgery, in contrast to other activities requiring high levels of psychomotor skills, such as sport. Recently, an eminent professional golfer, on being congratulated on a lucky shot, replied: "It's a funny thing, the more I practise, the luckier I get". This philosophy needs to be imported into surgery.

Overall, therefore, it appears that the limited availability of surgeons with the full range of skills required for a wide range of laparoscopic major general abdominal surgery will be a constraint on its development in the short and medium term.

Risk management

Institutions are increasingly using credentialling and proctoring (the overseeing of the initial operations of a surgeon by an experienced colleague) to protect themselves from liability for damage due to inexperienced surgery. It is becoming apparent that the safe practice of this surgery is surgeon-dependent to a high degree and that the practising surgeon needs intensive experience and continued collegial support and auditing. A momentum to develop local support networks is beginning to develop.

Institutions are also increasingly faced with dilemmas stemming from expensive technical developments and the early obsolescence of expensive equipment. Many developments, such as high definition and three dimensional visual systems, will make the surgeon's task easier and this will increase the margin of safety. The increase is hard to quantify, but, on the other hand, the errors which it may prevent, although rare, are very costly if they occur. If an error is perpetrated and less than state-of-the-art equipment was in use, liability would be almost inevitable. This presents institutions with the need for the frequent updating of an increasingly expensive line-up of equipment.

Faced with a limited availability of surgical skills and the considerable expense of the equipment, there is a strong probability that laparoscopic surgery will become concentrated in relatively few institutions.

General surgical principles

The likely influence of laparoscopic surgery over the transfer to day-case management of individual operations will depend on their suitability for the laparoscopic approach, now, or in the light of expected development. The great successes of the laparoscopic approach have been in operations where access and exposure are not problems and where the field of the operation is narrow – cholecystectomy being the prime example. It is less successful where a wide sweep of anatomy is required, where rummaging is needed or where loops of small bowel with fat mesenteries need to be retracted from the field. Tech-

nical difficulties may then prolong an operation unacceptably. Most of these technical difficulties should be susceptible to the technological improvements detailed above and the pace of the development of the surgery will be determined by this.

In excisional surgery, there is also usually the problem of the removal of the specimen. Abdominoperineal excision of the rectum is the exception to this. Specimens from anterior resection of the rectum have been removed through the intact distal rectum and anus, but this carries the risk of tumour implantation into the splits in the anus that the required dilatation produces. Implantation has also been reported in port wounds.

Possible solutions to this problem are under investigation. When specimens are removed through small wounds made for the purpose, they can be enclosed in fluid-tight bags to reduce the risk of implantation. If an intact specimen is not required, it may be placed in a bag and 'morcellated' or even liquidized. An intermediate process is to place the specimen into a bag, bring the neck of the bag through a port, pass a telescope and dissectors into the bag to dissect the specimen definitively for samples, and then to liquidize the remainder. A solution acceptable to surgeons and pathologists has yet to emerge and this continues to restrict wholly laparoscopic cancer surgery.

Day-case management of major abdominal surgery – general considerations

The reduction in wound pain achieved by using the laparoscopic approach is usually startling. Pain from port sites can almost always be controlled without the use of strong analgesia, using a combination of local anaesthetic infiltration, non-steroidal anti-inflammatory drugs and simple analgesia. Occasionally a patient will suffer a more general abdominal or subdiaphragmatic pain. This is sometimes due to the presence of blood or residual carbon dioxide irritating the parietal peritoneum, but often the precise cause is difficult to define. It will sometimes need morphine-like drugs for its control and such cases are not usually ready for same-day discharge from hospital.

The reduction in ileus can also be startling – and even unnerving, when an anastomosis is tested by peristalsis and evacuation on the day of surgery.

The laparoscopic approach minimizes the pain-associated cardiorespiratory complications associated with upper abdominal incisions. Complications which must be considered relate to the individual operations and will be discussed with them. They may not declare themselves within the first few hours following surgery, and early discharge following major operations must be accompanied by easy access to experienced advice and perhaps some degree of domiciliary monitoring after discharge.

The proportion of the patients who satisfy the general criteria for day-case surgery in whom same-day discharge can actually be achieved should therefore be high. Currently, the proportion of patients undergoing major surgery being treated as day cases is low in most centres.

This is in part a reflection of how much of the learning curve individual surgeons have negotiated, and there is a natural reluctance to relinquish patients unless the surgeon has absolute confidence in the surgery, based on long personal experience. There is also a lack of individual experience of the finer details of day-case management when it is being applied to major surgery. The limits of the possible in laparoscopic surgery are being tested and extended in all directions and the extension of day-case management must proceed *pari passu*.

Review contribution of the laparoscopic approach to specific disease groups

Cholecystectomy for gallstone disease

Gallstones become increasingly common with age. By the age of 80 yr, about one-quarter of all women and one-sixth of all men in the UK have gallstones. The potential caseload is therefore enormous and cholecystectomy is by far the most common major abdominal operation performed by general surgeons. Fortunately, only 10–20% of patients with gallstones develop symptoms and only patients with symptoms should be treated. Complications, such as empyema, common duct stones and ascending cholangitis, become more common and more serious with age. There is thus a relatively high proportion of elderly patients among those undergoing cholecystectomy. This will tend to reduce the proportion of patients who fall within the criteria for day-case management.

The rate of conversion to open surgery where the surgeon is practised falls to under 2% of cases and many of these relate to problems with common duct stones. With the use of ultrasonography, cholangiography and specific techniques such as dissection with the gallbladder opened and evacuated, there are very few gallbladders which cannot be safely removed laparoscopically by an experienced surgeon. Conversion precludes same-day discharge from hospital. Where septic complications of gallstone disease have been present, it will usually be inappropriate to discharge the patient on the day of surgery, but since these patients are usually old, they fall outside the criteria for day-case management anyway.

Apart from these exceptions, most cases that satisfy the general criteria for day-case management would be suitable for same-day discharge. The precise proportion of cases this represents will vary widely with the practice environment, but rates in excess of 50% are now conceivable. This figure will rise as perceptions within the general population and pressures from funding organizations regarding day-case surgery change. Nothing like this proportion is currently realized in most centres, for the reasons stated above.

The principal complications of cholecystectomy are haemorrhage, inadvertent perforation of a hollow viscus and the leakage of bile, with or without major ductal damage. Haemorrhage will normally declare itself in a carefully monitored patient within the first few hours after surgery. Small biliary leaks can occur in the best

regulated circles and such collections can usually be drained percutaneously under ultrasound control.

Perforations, biliary leaks and ductal damage may not declare themselves until 24 or 48 hr after surgery. The best management of major ductal damage is, of course, to avoid it altogether by skilled and meticulous surgery, but if it does occur, then the crucial aspect of management, if it is to be successful, is the immediate or early detection of the damage followed by a meticulous repair. Immediate recognition of damage is, in this author's opinion, one of the many reasons for performing per-operative cholangiography. The potential for the early detection of damage must imply that the patient has easy access to a skilled team in the event of even relatively minor symptoms.

Cholecystectomy is the most common major general abdominal operation performed in the majority of developed countries and the laparoscopic approach should produce a major shift in management from an inpatient to a day-case environment within the next few years.

Inguinal hernia repair

Laparoscopic inguinal herniorrhaphy had an uncertain start, with a number of weird and wonderful techniques being described. Practice is now stabilizing to the placement of preperitoneal patches of non-absorbable mesh, using either a transperitoneal or a preperitoneal approach.

The advantages of this operation are that patches distribute their fixation over a wide area, that foci of stress (which are inimicable to biological tissues) are avoided and that, if the boundaries of the patch are extended to well beyond the inguinal area, it is very unlikely that recurrences will find their way round the patch. An audit of my first 100 herniorrhaphies, where about half of the patches were fixed with staples and half not, suggested that fixing patches with staples was a cause of pain, which was significant in the context of what is otherwise a relatively painless procedure. I therefore insert large patches without fixation. The reduction in pain immediately following surgery is great and return to full function is rapid, so much so that the general criteria for the acceptance of patients for day-case surgery in my practice has been extended.

The technique, particularly if performed transperitoneally, is open to the potential of inadvertent damage to other structures. This implies that the surgery must be performed by a skilled and experienced surgeon, in ideal surroundings. It is currently performed under general anaesthesia, although regional anaesthesia or even local blocks may become possible.

The pain reduction and early return of function of the laparoscopic approach has to be compared with the pain reduction of the Lichtenstein repair and the improved pain control achievable nowadays in all open groin herniorrhaphies. There are well known and substantial difficulties in constructing valid controlled trials to compare pain and time to return to full function. Assessment of the long-term success – freedom from recurrence – is,

ipso facto, a long-term process. Funding authorities may be influenced solely by intra-hospital costs and, in turn, influence practice. It is therefore too early to say what proportion of herniorrhaphies will eventually be performed laparoscopically. If the laparoscopic approach is used, then it will encourage day-case management in a large proportion of patients.

Peptic ulceration, reflux oesophagitis and achalasia of the cardia

Oesophagomyotomy for achalasia of the cardia is more simply performed laparoscopically or thoracoscopically than by an open approach. The laparoscopic approach to this operation is very satisfactory, as access to a considerable length of oesophagus can be visualized with great ease through the hiatus telescopically. Disturbance of the anatomy is minimal and reflux, without an anti-reflux procedure, does not appear to be a problem. Return of function is immediate and day-case management should be possible. The condition is, however, relatively uncommon and the impact of a change to day-case management would be slight.

In many countries the treatment of uncomplicated peptic ulceration and reflux oesophagitis has come to be dominated by drug therapy. In other countries the funding organizations prohibit repeated courses of drug therapy and there is a call for surgical treatment. As the effectiveness of the laparoscopic approach to the surgery of these conditions becomes established, the former situation may change.

Variations on the Nissen fundoplication are the most commonly employed option for the treatment of hiatal hernia in both open and laparoscopic surgery. The operation converts well to the laparoscopic approach and operating time in experienced hands is in the region of 1 hr. Recovery of gastric function is almost immediate and very early discharge is now possible.

Highly selective vagotomy for recurrent or unresponding duodenal ulceration can be performed laparoscopically. The Taylor operation – posterior truncal vagotomy and anterior seromyotomy – has been validated in open surgery and is simple and far less tedious to perform laparoscopically. Return of gastric function is again very rapid. Certainly, very early discharge occurs now.

Gastrectomies for gastric ulceration have been performed laparoscopically. They can be technically demanding, particularly in the present state of instrument development, and they fall outside the scope of early discharge surgery.

Of the complications of peptic ulceration, perforation of duodenal ulcers is ideally treated laparoscopically. Laparoscopy confirms the diagnosis and, at least in my practice, the condition is often associated with heavy smoking and alcohol habits. Pyloric stenosis can be treated with a truncal vagotomy and a pyloroplasty or a gastrectomy, both easily performed laparoscopically. Bleeding from a duodenal ulcer can be treated with

pyloroplasty and underrunning of the ulcer, together with a vagotomy.

Oesophageal, gastric and pancreatic cancer

Operations for these cancers have been performed laparoscopically, or with laparoscopic or thoracoscopic assistance. They are very much at the leading edge of development and are not within range of early discharge at the moment.

Colorectal disease and prolapse of the rectum

In applying the laparoscopic approach, the colorectal surgeon can encounter all the difficulties detailed in the general section above. It is possible to see deep into the pelvis with a detail which is unsurpassed, but in a fat male with a narrow pelvis and a large rectal tumour this can be virtually impossible. The need to make an incision to remove a tumour gives the opportunity to perform part or all of the anastomosis outside the abdomen, using conventional techniques, the so-called 'laparoscopically assisted' operation. Oncological concerns have been expressed regarding laparoscopically performed or assisted operations, but there is no reason why these operations should achieve a clearance which is less complete than an open operation – indeed, in some circumstances, the reverse may be true.

Right hemicolectomies can mostly be performed laparoscopically assisted. Abdominoperineal resection of the rectum, subject to the restrictions of access detailed above, are ideally performed laparoscopically. Extensive left-sided colon surgery, anterior resections and operations for inflammatory bowel disease and rectal prolapse can provide considerable problems for the laparoscopic approach and will continue to do so until there are substantial developments in the overall technology. Conversion rates for these operations will remain far higher than for other forms of laparoscopic surgery. Recovery from ileus is rapid, pain reduction is considerable and hospital stay is reduced. Some patients recover very rapidly indeed following right hemicolectomy or surgery for rectal prolapse, but major colorectal surgery is, for the most part, not going to be a day-case or short-stay procedure in the foreseeable future.

Node dissection

Pelvic node dissection is becoming a more common procedure again, either for treatment or for staging, for example, for prostatic carcinoma. Provided no other procedure, such as an inguinal node dissection, has been combined with the pelvic dissection, disturbance is minimal and same-day discharge can be considered.

Upper thoracic sympathectomy for hyperhidrosis

The thoracoscopic approach greatly simplifies this operation and it can be performed as a day-case procedure.

Emergency surgery

The huge benefit which laparoscopy provides in the emergency situation is the establishment of a diagnosis without the need for an incision. This applies to inflammatory conditions, such as appendicitis, and to abdominal trauma. Increasingly, it is possible to establish a diagnosis in, and to discharge after a few hours in a 23-hr admitting ward, patients who otherwise would have needed observation for one or more days in an inpatient unit. Recovery from therapeutic procedures, such as appendicectomy or the division of band adhesions, can be so rapid that discharge home from the admitting ward is possible.

Conclusions

In the past a major part of the reason for keeping surgical patients in hospital has been the need for pain control in, and physical support of, patients disabled by their surgery. Already, improved pain control, coupled with the clinical and management skills learned in the day-case environment, has created the potential for transferring the major part of intermediate general surgery to the day-case unit. The laparoscopic approach to intermediate surgery, chiefly herniorrhaphy, by offering reduction in pain and even more rapid return of function, will help in this process.

The revolution currently promised by laparoscopic surgery is the transfer of a large tranche of commonly performed major abdominal surgery into the day-case unit. The implications for day-case units are substantial. Major surgery has a greater potential for serious complications and access to advice and even monitoring after discharge must be improved. Care teams will need ongoing experience in the management of major abdominal surgery, particularly in the early detection of complications.

At the same time inpatient units will have an increasing interest in the pooling of resources with day-case units, regarding the provision of training and experience in the management of major surgery, the very early discharge of postoperative patients, the rapid turn-round of emergency patients and in providing monitoring and easy access to hospital-based advice for recently discharged patients.

This revolution is tied to the development of laparoscopic surgery. The predicted concentration of laparoscopic surgery into fewer units, coupled with the convergence between day-case and inpatient units which major day-case and early discharge surgery will stimulate, is likely to work against the tendency for day-case units to be dispersed into the community and to stand alone.

Laparoscopic surgery seemingly has brought day-case surgery to the threshold of another major step forward. This may be accompanied by considerable changes in the way in which day-case units are organized and used.

Patient choice in sedation anaesthesia and recovery room analgesia

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Day surgery, with its unique environment and personalized care provides an opportunity for patients to have more control over their perioperative management. Patient choice for anaesthesia and postoperative analgesia can be offered at the preoperative assessment stage as part of an informed consent procedure. Patient controlled sedation, with propofol as the preferred drug, is an example of a new intraoperative sedation technique, where patients have control of their own sedation. It has been shown to be a safe technique with high patient satisfaction. Further studies in patient control with analgesic drug and route options in the recovery room and home will help define advantages in this area.

Key words: Patient-controlled sedation, propofol, day surgery, choice

Introduction

Day surgery offers a unique environment in which close communication between patients and staff facilitates patients having more control over their perioperative management. As part of the informed consent, a patient controlled sedation (PCS) technique may be offered. PCS is an intraoperative anaesthetic technique used for sedation with local or regional anaesthesia. Patients also need to select analgesic drug, route and timing of medication in the recovery room and for the discharge period. The advantages of giving patients more control in the perioperative day surgery period are increased patient satisfaction and confidence to manage postoperative pain, with the potential for earlier return to activities of daily living and work.

Control over events is important for both the comfort and safety of the individual. Control over the environment can be said to exist when the outcome is determined by one's responses¹. Hospitalization and surgery are examples of events over which the patient may feel he or she has little control. Day surgery provides an opportunity to restore control to the patient: privacy and mobility are encouraged with early return to the home environment.

Giving informed patients the opportunity for choice

will increase their confidence to control an event successfully. The desire for control increases when participants have more understanding of the situation they are confronting. Personal differences clearly play a role in the desire for control. 'Locus of control' as described by Rotter² is the extent to which patients feel able to control their own health. Patients presenting with an internal locus of control believe that they are solely responsible for their own destiny and enjoy having control. Alternatively, persons who believe that forces beyond their control (i.e. other people, luck) are the reason for their success or misfortune, have an external locus of control. This group of patients feel more comfortable having others control anaesthesia or analgesia. Averill has estimated that 10–20% of the population finds the availability of control and the responsibility for it stress inducing³. However, lack of control is much more disturbing to some patients than to others as it significantly increases anxiety. It would therefore seem appropriate to offer a choice of control to the day patient to reduce anxiety during the perioperative period providing the potential for improved day surgical care.

Preoperative assessment

At the time of preoperative assessment, information and risks pertaining to the patients' anaesthesia should be discussed as part of an informed anaesthetic consent. The incidence of complications for different anaesthetic techniques in specific institutions should be considered prior to discussing anaesthetic options with the patient. A choice of anaesthesia may be possible, particularly if

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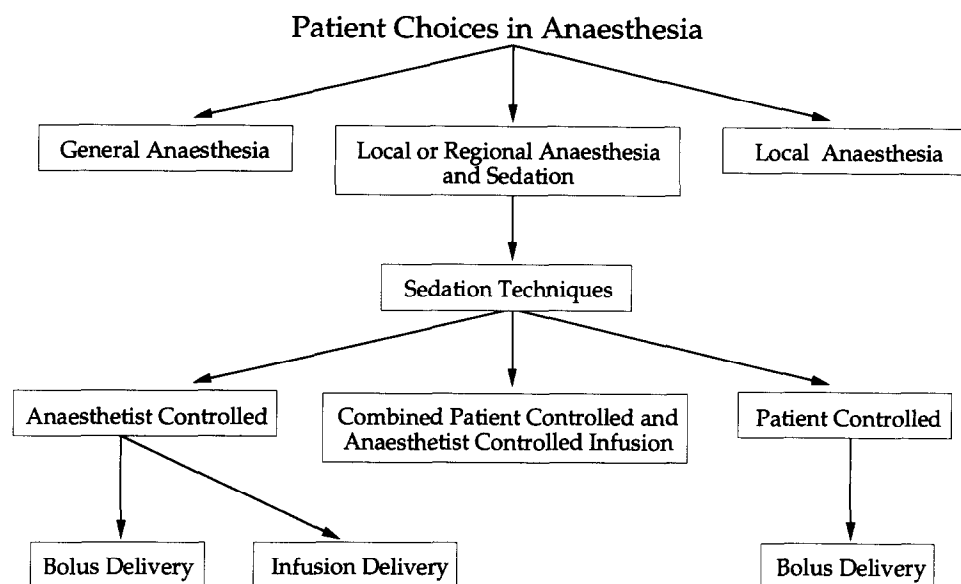


Figure 1. Patient choices in anaesthesia.

the surgery can be performed under regional or local anaesthetic technique in combination with sedation anaesthesia. PCS⁴ may then be an alternative in which behavioural and decisional anaesthetic control is given to the patient during surgery. Potential advantages of local anaesthesia and sedation over general anaesthesia are reduced morbidity and shorter recovery room times for day patients. An outcome study in 1180 oral surgical patients in a major public hospital day surgery unit identified complication rates. There were no complications associated with local anaesthesia and sedation (385 patients), but eight patients suffered major anaesthetic-related complications with general anaesthesia (795 patients)⁵.

In preparation for postoperative pain management, medical or nursing staff should discuss with patients the analgesic drug options and routes of administration. This will give the patient confidence to make a suitable choice and control his/her analgesic requirement postoperatively. There are advantages in discussing these options and other day surgery issues preoperatively as Egbert⁶ has shown. Positive preoperative instruction and encouragement reduces the requirements for postoperative analgesia.

Day of surgery

On the day of surgery, patients often have a number of concerns about surgery and anaesthesia. Some do not want to be awake, see or hear their surgery. Others may be concerned about loss of control, dignity or privacy. Patient fears about their ability to tolerate pain and temporary separation from family or friends also increases anxiety. In an inpatient study of patients using patient control devices for postoperative analgesia, patients with higher anxiety were reported to have higher pain scores and made more frequent patient control demands⁷. Giving anxious patients as much control as

possible during the perioperative period therefore appears to be a sensible approach so the patient can self-medicate to his or her own perceived needs. Reports of patient control for anxiety using a patient control technique, appeared after patient controlled analgesia (PCA) devices became widely used for postoperative analgesia^{8,9}. However, advantages of a self-medicated anxiolytic technique for day patients must be weighed up against the extra nursing surveillance and physical space required for premedicated day patients. If anxiolytics with long acting half lives are used as premedicants postoperative drowsiness may delay patient discharge.

Anaesthetist administered sedation techniques

Where procedures can be performed under local or regional anaesthesia, avoiding the risks of general anaesthesia, then a choice of sedation techniques can be provided by the anaesthetist (Figure 1). The anaesthetist can control the sedation technique either by bolus doses of sedative agent or by an infusion technique¹⁰. In both cases the anaesthetist titrates the sedation drug to the anticipated needs of the patient. An alternative method of sedation is a technique by which the patient may be in control of his own sedation, called PCS. There has been recent interest in this technique worldwide, with published information using differing drugs and patient demand variables¹¹⁻¹⁴.

Patient controlled sedation

Patient suitability should be considered preoperatively. The anaesthetist must ensure that there is no communication or language barriers so the patient can understand the simple instructions required to manage the patient demand button. Children may be suitable if they can grasp the concept of the push button. Importantly, the patient must agree to be 'in control'. Patient preoperative

Table 1. Sedation scale

1	Fully awake
2	Drowsy
3	Eyes closed but rousable to command
4	Eyes closed but rousable to mild physical stimulation
5	Eyes closed and unrousable to mild physical stimulation

familiarization with the patient demand button increases confidence. A patient information video about the technique shown preoperatively can also assist understanding and streamline the preoperative interview. Patients should be instructed that by pressing the patient demand button, medication will be delivered to make them sleepy and comfortable. If they wish to become more sleepy at any time, they should press the patient demand button again. It is important to emphasize to the patient that they cannot oversedate themselves, and the anaesthetist will be present and will be monitoring him/her continuously during the sedation period.

Loading dose, bolus dose and lockout interval are programmed into the patient demand pump by the anaesthetist. The lockout interval provides a margin of safety for the patient by preventing further drug delivery if patient demands are initiated during this period. However, the most important safety aspect with intraoperative PCS is the presence of an anaesthetist, carefully monitoring the patients' sedation level. Acceptable sedation is up to and including sedation level 3 (see Table 1), where the patient's eyes are closed but he or she is rousable to command. Oxygen via nasal cannula should be administered and pulse oximetry measured continuously during the PCS technique as this will accurately detect any desaturation. From clinical experience, a patient type that should be treated with caution is the obese patient with a history of snoring. Their airway control can become compromised before reaching sedation level 3. This reinforces the importance of careful history-taking preoperatively. PCS should be initiated before the administration of local anaesthesia or commencement of surgery to allow the patient to control their apprehension or anxiety. Patients titrate the sedation drug dose to their own perceived needs.

Set-up for PCS is simple and quickly implemented. Anaesthetists should check the patient demand pump and infusion lines prior to their use. The patient demand pump should deliver the drug through a minimum volume side arm attached to the Y-piece of an infusion set (Figure 2). It is convenient to connect a three-way tap directly to the 50 ml syringe, for ease of drug refilling. The other arm should contain a one-way valve to prevent reflux of drug. For ease of administration it is useful to follow a PCS checklist (Table 2).

Various drugs have been used for the PCS technique, but propofol and midazolam have been most popular. Alfentanil has been used for intraoperative patient-controlled analgesia. It provided comparable analgesia to physician-controlled administration with respect to patient comfort and satisfaction during vaginal ovum

pickup procedures¹⁵. In a comparative study between midazolam, propofol and alfentanil during surgical procedures under local anaesthesia, Ghouri et al. used background infusion of drug together with self-administered drug using a patient-controlled delivery system. Midazolam and propofol had fewer perioperative problems than alfentanil and were equally acceptable to patients with respect to sedation, discomfort and anxiety¹⁶. Other studies suggest that propofol may be the drug of choice for PCS with its favourable pharmacokinetic properties and its euphoric effect on mood. For procedures with rapidly changing intraoperative requirements, propofol is the preferred drug¹¹. Recovery of memory and mental performance is reported to be faster in patients sedated with propofol than midazolam¹⁷. This is of practical significance to day patients as they can remember discharge instructions.

The safety and effectiveness of PCS will be influenced by the sedative drug used and the settings of the patient demand variables. Selection of appropriate settings for different sedative drugs should come from published data and individual clinical experience. One of the limiting factors for the widespread use of the PCS technique has been the availability of a commercial patient demand pump to provide fast bolus infusion rates, such that the bolus drug delivery can be achieved within a short period. Presently available commercial patient demand pumps can provide a maximum bolus infusion rate of only 200 ml h⁻¹ (Graseby 3300). However, this patient demand pump also has provision for an initial loading dose and a background infusion of drug simultaneously with patient demand bolus doses. This pump facility, allowing a combination of low dose background drug infusion and patient demand dose still offers the advantages of patient control. Further studies with the combination of background infusion and patient demand bolus dose will determine the settings for safe sedation anaesthesia.

The question remains whether sedated patients can competently decide on their need for further sedation or can remember how to trigger their sedation doses. PCS experience with propofol shows that patients do remember how and why they have to press the button and from published data no patient has been oversedated^{13,14}.

One of the main advantages of the PCS technique is the high patient satisfaction associated with its use^{4,11-14}. When patients are offered the choice of sedation, 95% of patients accept the PCS technique and none have expressed regret after using it. The described effect of propofol on mood¹⁸ may contribute to the increased patient satisfaction but other published studies suggest that patients like the PCS technique itself¹³.

Recovery room

Studies with inpatients by Donovan and Dillon¹⁹ have shown that patients actually receive less than 25% analgesic medication needed to control postoperative pain. Teske reported poor correlation between nurses' observations of their patients' pain and reports of pain

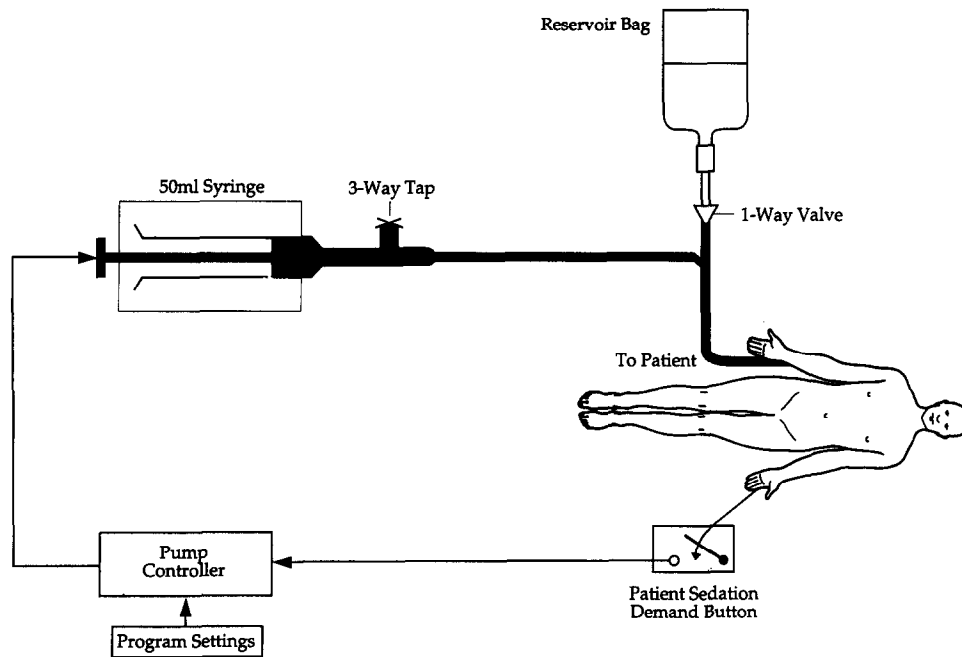


Figure 2. Patient-controlled sedation set-up.

Table 2. Suggested checklist for patient-controlled sedation

1. Patient
 - (a) Oxygen administered
 - (b) Monitoring equipment attached
 - (c) Intravenous cannula in situ
2. Before starting PCS the anaesthetist should confirm that:
 - (a) Drug infusion lines are primed and purged of air
 - (b) The infusion lines are purged with drug and the pump itself is primed in order to provide an initial efficacious drug dose
 - (c) Drug infusion lines are connected to the reservoir bag
 - (d) Clips and clamps have been removed from infusion lines
 - (e) Infusion device settings are correct – bolus dose, lockout interval, bolus dose infusion rate and background infusion (optional)
3. Frequently, the anaesthetist should confirm that:
 - (a) Drug infusion lines are connected to the reservoir bag
 - (b) Free flow from the reservoir bag
 - (c) Pump alarms are not active
4. Periodically the anaesthetist should confirm that the supply of drug remaining in the syringe is adequate and the amount of drug infused correlates with the printout of the summated drug delivered.

experienced by the patients themselves²⁰. These misconceptions about pain indicate a need to give patients more analgesic control. This is particularly relevant in the day surgery setting where the adequacy of postoperative pain control is one of the determining factors for discharge from the day facility²¹.

Informed patients will very often suggest which analgesic drug suits them best from previous experiences. However, with continued advancements in drug preparations and delivery, we are in a position to provide patients with more choices of analgesic preparations and delivery systems. Commonly used alternatives in day surgery include oral, intramuscular and intravenous routes. Giving patients choice with oral analgesia and encouraging them to decide when next to take their medication, increases the patients' sense of control. How-

ever, the greatest improvements in day surgery postoperative analgesic administration is with patient alternatives in drug delivery systems. EMLA cream (eutectic mixture of local anaesthetics) application has a place in the day surgery setting, as it is a safe and effective topical anaesthetic. Further use of this agent may be extended for postoperative split skin harvesting, insertion of grommets in middle ear surgery and skin lesion excision analgesia²². Studies by Karl²³ and Striebel²⁴ have shown the intranasal route to be an alternative route of administration for midazolam and fentanyl. This may become an important alternative if an appropriate patient demand administration system can be developed.

Intravenous opioids for moderate to severe pain are often used in day surgery. Administration can be either nurse controlled or by patient request, or a combination

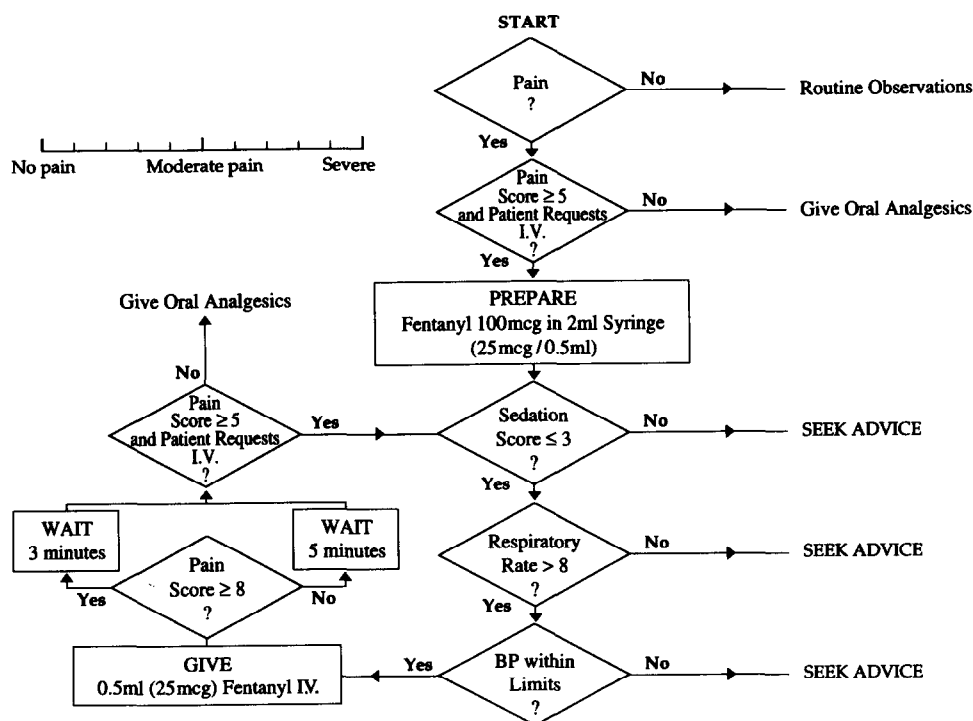


Figure 3. Fentanyl pain protocol.

of both. It is not necessary in this instance to use sophisticated pumps for the patient to have control. A practical method of increasing patient control is to have the patient participate in his own management of intravenous narcotic by means of a fentanyl pain protocol (Figure 3). The use of a visual analogue pain score and patient request allows a degree of patient control over his/her intravenous narcotic, provided there is good communication with the nurse. Extensive experience in the inpatient area using PCA pumps delivering postoperative analgesia has met with great success and patient acceptance. However, there has been no published work with patient demand pumps in day surgery recovery. More work is necessary on the relative outcomes of patient control analgesia with pumps in the day surgery recovery room.

As patients have a continued recovery period at home, it is most important that they feel comfortable with their 'take home' analgesia. As the limits of day surgery continually expand, home options for drugs and delivery systems will need to be more clearly defined, as will home care nursing. Patient demand pumps have been used for day patients in the home setting where small devices have facilitated their use²⁵. However, consideration must be given to cost involvement and education for health professionals, patients and their families. The safety aspects of patient demand pumps including the requirement for monitoring is also important. Published data has shown that for cancer patients, there have been lifestyle improvements where patient demand pumps are used in the home setting. However monitoring is necessary, as there have been reports of respiratory depression²⁶.

Conclusion

We are in an exciting era of day surgery, providing care for more patients, less fit patients and more complex procedures. We have an obligation to inform patients preoperatively and to discuss risk management. Choice options are an integral part of this process. Given the unique environment that day surgery offers we have the opportunity to provide improved patient care by giving patients more control over sedation anaesthetic techniques and recovery room analgesia.

PCS provided by the anaesthetist is now a practical alternative for sedation anaesthesia with increased use of short acting drugs such as propofol. For the future if a patient control facility is available on a reliable anaesthetic infusion pump, this sedation technique could be adopted as an integral part of anaesthesia, offering improved patient satisfaction and versatility in anaesthetic practice.

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Future developments in minimal access surgery in gynaecology

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Key words: Endoscopy, laparoscopy, hysteroscopy, minimal access surgery

Endoscopic procedures are being introduced into every branch of surgery. These techniques are often described as being minimally invasive, which is a misnomer and it should be understood that laparoscopy is simply a means of access by which major operations can be carried out which previously were performed through a laparotomy incision. Undoubtedly there are certain attractions to this kind of surgery. As with any new technique, this field is evolving and gynaecological surgery of the future may be very different from the gynaecological surgery of today. Predicting the future is at best a difficult exercise. Nevertheless it is the purpose of this article to examine some of the procedures which are now being performed endoscopically, evaluate the validity of these procedures, and to try to predict how endoscopic surgery will be performed in the future.

Currently performed procedures

Until the early eighties the only gynaecologic endoscopic procedures which were performed were laparoscopic sterilization, lysis of adhesions, and destruction of small areas of endometriosis. The hysteroscope had been used to divide adhesions, septa and to resect fibroids; laser endometrial ablation had been described. Very few of these procedures, other than sterilization, were being performed routinely by general gynaecologists.

In 1994 it is easier to list the gynaecological operations which cannot be performed by endoscopic means than those which can. We have moved from the time of laparoscopic sterilization to a time where some pioneers have

begun to perform radical hysterectomy by endoscopically assisted means.

Evaluation

These procedures have been introduced with remarkable speed but little thought has been given to their true place in the surgical repertoire. It would seem reasonable that all new surgical procedures should be submitted to scientific scrutiny and an evaluation which would include assessment of the indications, a cost benefit analysis, and an understanding of the complications, not only in the hands of expert surgeons, but in the practice of those with limited experience. The efficacy of any given treatment must be established, both with respect to that option and in comparison with other treatment options. It is not possible in the limited space of this article to evaluate every possible procedure. Illustrative examples will be taken.

Indication

Infertility and habitual abortion are common conditions. It is widely believed that uterine septa are a cause of habitual abortion. It is possible to perform myomectomy by laparoscopic means in such patients. Are these indications valid?

It would appear on initial evaluation of published data, that resection of a uterine septum would appear to improve the chances of carrying a subsequent pregnancy in a woman with habitual abortion. De Cherney et al. achieved a 53% term delivery rate following hysteroscopic resection of uterine septa in 72 patients¹. A 73% pregnancy rate was achieved by Daly's group²; these were uncontrolled case series. A retrospective non-randomized study of 20 women who underwent resection of their septa and 17 who did not undergo surgery has been performed³. Seventy per cent of the treated and 71% of the non-treated women delivered living children. The

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numbers in this study are too small to say that a type two error is not possible, and that indeed a difference does exist, but it has not been detected. At least there should be some consideration as to whether or not resection of the uterine septum is truly indicated.

Those myoma which can be resected laparoscopically tend to be of the subserous variety and it is possible that they do not contribute to infertility. It is worth noting that fibroids occur in 20–25% of women over the age of 30⁴. Ross et al. showed in a cohort study that 89% of women with fibroids had delivered at least one infant at term and the relative risk of spontaneous abortion was slightly, but not statistically, significantly increased⁵. Thirteen series of myomectomies were summarized by Vercellini et al.⁶. All the women were complaining of infertility, 314 women wished to become pregnant and 172 (55%) did so. Regrettably all of these studies used a patient as her own control. The outcome had no surgery been performed, clearly is unknown.

It is reasonable to infer on physiological grounds that fibroids which distort the uterine cavity or the fallopian tubes may indeed interfere with conception and implantation. Many of these are amenable to hysteroscopic resection but are the very lesions for which laparoscopic approaches are unsuitable.

Cost

It is widely assumed that endoscopic surgery is less expensive; Daly et al. were able to demonstrate a net savings of US\$4000 per case, when resection of septa was performed hysteroscopically rather than by the abdominal route². Undoubtedly such patients recover more rapidly, suffer less, and can return to the workforce more rapidly. These savings, of course, are only valid if the indication for the operation was valid in the first place. The fact remains, at present, that while many surgeons honestly believe that resection of uterine septa is to the advantage of the woman with habitual abortion, this assumption has not been proven by rigorously controlled studies.

Many variations of hysterectomy are being performed laparoscopically, the earliest was laparoscopic assisted vaginal hysterectomy (LAVH). In this procedure the upper pedicles are freed by laparoscopic means, and the uterus is removed through the vagina. It would seem that a number of these procedures which would have been performed as a routine vaginal hysterectomy in the past are now being performed with laparoscopic assistance. Summit et al. prospectively randomized 56 patients to either vaginal hysterectomy or LAVH; 27 underwent LAVH and 29 a routine vaginal hysterectomy⁸. When outcomes of interest were compared it was noted that the incidence of febrile morbidity was similar in both groups, the mean operating time for LAVH was 120.1 min which compared poorly with a 64.7 min mean time for vaginal hysterectomy. The difference in cost was dramatic. Vaginal hysterectomy cost \$4891 and LAVH \$7905. It may well be that in the future when the instruments required to perform these procedures become less expensive and

when surgeons develop more experience and reduce their operating times, this cost margin will diminish. Certainly the ability to convert a procedure which would have been an abdominal hysterectomy into a laparoscopic assisted hysterectomy does offer the patient certain advantages, which include less pain and more rapid recovery to normal activities. The recently described subtotal laparoscopic hysterectomy may indeed prove to be superior to both LAVH and vaginal hysterectomy.

Complications

It is important that the magnitude of risk of any new surgical procedure is understood before such a procedure is widely adopted. Fortunately risks of modern surgery are small, but this leads to the need for evaluation of a very large number of cases before the frequency with which complications occur can be determined. Some data are available from large studies. The Royal College of Obstetricians (UK) has collected data from 147 centres which were performing hysteroscopic endometrial ablation⁶. Information was available with respect to 6850 cases, in which there were four deaths (0.24%), a rate which compares favourably with the 0.1% reported for hysterectomy¹⁰. Major complications occurred in 2.5% and included uterine perforation (1.25%), fluid overload (0.4%), infection (0.4%) bleeding (0.2%) and organ injury (0.1%). It would seem that from the perspective of risk, endometrial ablation is a relatively safe procedure. Such information is not available in larger series for other hysteroscopically performed operations; 17 521 cases of laparoscopy were reported from seven major centres in France¹¹. There were 8343 diagnostic and 9178 operative cases. There was only one death which occurred in the operative group following vascular injury by a Trocar. In the operative group the following procedures were performed: lysis of adhesions, conservative surgery for ectopic pregnancy, salpingectomy, distal tuboplasty, ovarian cystectomy, conservative surgery, pelvic inflammatory disease, endometriosis, and uterine suspension. The 48 major complications which occurred gave a rate of 5.23%. These are very valuable data. It is to be hoped that in the near future similar figures will be available with respect to more complicated laparoscopic surgical procedures, which will include laparoscopic hysterectomy, myomectomy, lymphadenectomy and bladder neck suspension.

Efficacy

It would be difficult to justify introducing a new procedure if it were to be found to be less effective than the one it was designed to replace. There are some clear examples of the value of laparoscopic surgery. Conservation of the tube in a woman with an ectopic pregnancy is best performed by the laparoscopic route, and it is difficult today, except under exceptional circumstances to justify the performance of a laparotomy for such a condition. If, however, attention is turned to endometriosis, when the patient's primary complaint is one of

pain, it is clear that a considerable number of women will find relief from their symptoms following surgical destruction of the lesions. In many cases it is simpler to perform this surgery by laparoscopic means, although from the perspective of efficacy, laparotomy and laparoscopy have never been formally compared. The association between endometriosis and infertility is still very confusing. A well designed study of treatment-dependent, and treatment-independent pregnancy rates following surgery for revised American Fertility Society (AFS) stage 1 and 2 endometriosis, does appear to suggest a beneficial effect¹². A comparison of laparoscopy vs. laparotomy to treat these conditions showed no difference in outcome¹³. If laparoscopic surgery is to be justified for the treatment of mild to minimal endometriosis, further studies are required to demonstrate that pregnancy rate is improved. If such proves to be the case the justification for performing the operation by laparoscopic means would become those of a saving, both in money and in discomfort for the patient.

Endometrial ablation, a technique used for heavy menstrual bleeding, is becoming a very popular approach. The same study which evaluated the safety of hysteroscopy also questioned its efficacy⁹. Of the 6850 women who had been treated for dysfunctional bleeding 22% had required further surgery within one year, and almost half of these had undergone a hysterectomy, the very operation that hysteroscopic ablation was meant to replace. There are further questions with respect to endometrial ablation, which can only be answered after long term follow up studies have been performed. It is unclear whether such women would be at a greater risk of developing uterine cancer and whether or not such cancers would be occult because they would be hidden behind the scarring following the ablation. A recent study of extirpated uteri has demonstrated that following ablation, all of the specimens contained histologically normal-appearing endometrial glands underlying the coagulum¹⁴.

Options

It is reasonable to regard all surgery as a failure of medical treatment. Any therapeutic option which is equally or more effective, less invasive, and carries an equal or lower rate of complications will replace endoscopy, just as in certain instances endoscopy is replacing traditional surgery. An example of this concept is the evolving and complementary roles of laparoscopic tubal reparative surgery and the use of the new assisted reproductive technologies (ART).

If a woman is infertile because of tubal damage, she only has two viable options if she wishes to conceive. It is possible to state with a fair degree of accuracy, because of the work of several national registries, the likelihood of success following *in vitro* fertilization and embryo replacement. Armed with this information the surgeon can present to the patient a comparison of her likelihood of success using ART or following tubal reparative surgery. Scoring systems have been developed upon which it is possible to base predictions when tubal surgery is

considered¹⁵. The distal ampullary diameter, thickness of the tubal wall, nature of the tubal mucosa, extent of any periaxial adhesions and the type of these adhesions must all be factored into the equation. It would seem reasonable that if an individual woman had a much lesser chance of conception following tubal surgery than following ART the less invasive, though admittedly more expensive, procedure should replace the surgical option.

It is now possible to treat ectopic pregnancy by the administration of cytotoxic drugs. When 100 patients received methotrexate, 96 were considered to have been treated successfully and only five experienced side effects¹⁶. The tubal patency rate on the affected side was 84%. The recurrence rate of ectopic pregnancy among patients who subsequently conceived was 10%. It is now also possible to inject cytotoxic agents directly into the gestational sac using ultrasonographic guidance¹⁷. Whether these less invasive options will ultimately replace laparoscopic surgery for ectopic pregnancy remains to be seen.

Predictions

In the latter half of the 20th century medical practice is no longer carried out in a vacuum, and is often submitted to intense scrutiny which is often partisan and ill informed. Patients' preferences and practice patterns can be as much influenced by public pressure as by the results of scientific study. It is a combination of influences both internal and external to the discipline which will shape the future course of endoscopic surgery in gynaecology. Within the profession the need to innovate will continue and the need to follow in the footsteps of the innovators will become increasingly apparent. It is this latter effect which is in part responsible for our willingness to embrace new approaches before they have been submitted to proper scientific scrutiny.

There is a remarkable paucity of solid information evaluating the new approaches and comparing them with the old. Some excellent starts have been made with the establishment of national registries and some small randomized studies, but a number of pressing questions need to be answered urgently and include:

1. How effective is endometrial ablation as a treatment for abnormal uterine bleeding and does it pose any long term risks of the development of uterine cancer?
2. Is it valid to resect uterine septa in women who complain of habitual abortion?
3. Should we reject vaginal hysterectomy in favour of LAVH?
4. Which fibroids should be removed, which should be removed by endoscopic means and which will still require that a formal myomectomy be performed?

Laparoscopy is beginning to find a place in oncological surgery to perform laparoscopic lymphadenectomy. Removal of the lymph nodes may be regarded as a diagnostic or therapeutic manoeuvre; Querleu et al. have reported their results from 39 patients who underwent laparoscopic lymphadenectomy¹⁹. The procedure took

about 90 min to complete and a mean number of nodes removed was 8.7, with a range of 3–22. These data contrast with a mean of 40 nodes removed during abdominal lymphadenectomy. A complete radical hysterectomy performed by laparoscopic methods can take up to 9 h to complete. If node sampling is not adequate and surgical times greatly prolonged, it may be that while the laparoscopic approach is technically feasible, it may not be medically justifiable.

Clearly the answers to these questions and others can only come from properly conducted observational studies of large numbers of patients, and where it is the appropriate method from randomized clinical studies of sufficient statistical power to be credible. It remains to be seen whether or not we as a profession have the collective will and the resources to begin to amass answers to these questions, and whether or not we will be prepared to modify our practices voluntarily if the answers do not confirm our earlier hypotheses.

The effect of external influences are even more difficult to predict. Advances in the instrument manufacturing sector occur with startling rapidity. Virtual reality is already being explored as a surgical training mode, it may well soon find a clinical indication. Robotic scalpels are more accurate than the human hand and are not, as is the surgeon's hand, at any risk of infection following needle puncture. Remote procedures can be carried out in space using telecommunications technologies. Is it possible that in the future a surgeon will give direct surgical commands to robotic scalpels, using telecommunications to an operating room several thousand miles distant?

Two of the major problems with laparoscopic surgery are the present methods of suturing and ligation which are cumbersome, time consuming and inefficient, and the removal of large tissue specimens. It is probable that suturing and ligating methods will be improved in the future. Although at present large tissue specimens must be removed by opening the vagina or extending the abdominal incision, morcellating devices are already being described. Steiner et al. have designed a cutting cylinder which is introduced through a 14 mm cannula and driven by an externally cited electrical microengine with which large tissue specimens can be morcellated and removed through the 14 mm cannula¹⁹.

Consumer pressure is affecting the practice of medicine as never before. The patients are no longer passive recipients of our administration and quite reasonably expect to be informed and to play their part in defining management. The media can sway public opinion; already we are being asked to perform endometrial ablation in inappropriate circumstances because it has been extolled on a television talk show! The indications for LAVH may be more to preserve an individual surgeon's practice than because it is demonstrably better than a simple vaginal hysterectomy. We live in a world of increasing fiscal constraints. While it may be that new three dimensional imaging telescopes and the necessary backup video equipment is better than the older instruments, it will be incumbent upon us to demonstrate to

those who must fund the purchase of such equipment that the measurable outcomes are demonstrably better. In many instances, the purchase of even simple endoscopic set ups may be beyond the financial abilities of some institutions. We also live in an era of intense regulatory pressure. In Canada and America no new drug can be introduced until it has been submitted to intense testing by the Health Protection Branch of the Federal Government of Canada, and the Food and Drug Administration of the United States. It is unlikely that those responsible for public policy will for much longer permit the random introduction of new surgical procedures without insisting on a rigorous evaluation process.

Finally no one can predict where advances in medical management may next occur. The fields of genetics and molecular biology are progressing with amazing rapidity. At a simpler level it was hoped that the gonadotrophin releasing agonists would provide medical treatment for fibroids; regrettably this promise was not fulfilled, but it may be that some other compound, for example one which might interfere with the actions of epidermal growth factor, may give us a weapon with which to shrink fibroids permanently, thus removing any need for surgical intervention.

Conclusions

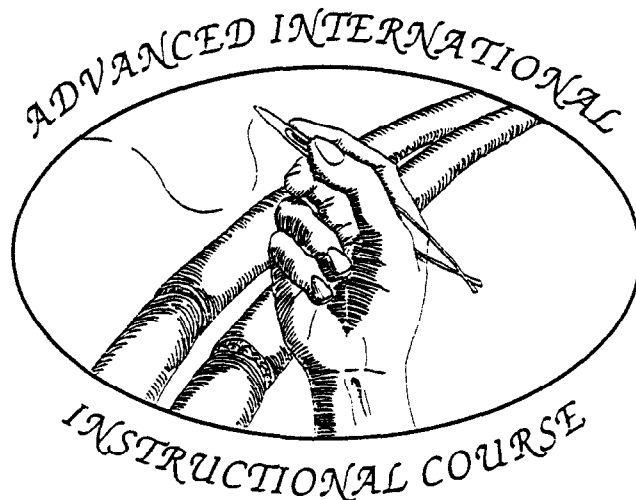
By examining present knowledge and trying to identify some of those forces which experience teaches may well exert effects of the direction of surgical practice, an attempt has been made to see into the future. This article has indulged in a certain amount of speculation but it will conclude with some very concrete hopes that gynaecologic endoscopic surgery will continue to evolve, at least until the surgical options have been made redundant by the introduction of effective medical therapy. The indications will be refined. Surveys and randomized studies will be performed. The influence of factors external to the practice of medicine will not influence too damaging an effect. If such an approach is developed it is probable that invalid procedures will become footnotes to medical history and that valid procedures will be refined to bring to our patients the undoubted benefits of endoscopic surgery.

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The introduction of laparoscopic cholecystectomy to Australia and New Zealand: an illustration of establishing training and standards for new clinical privileges

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The introduction of new technology or procedures raises the issues: who should do it and use it? what training should they have? where should it be performed? what cases are appropriate? and how is outcome evaluated and who does the evaluation? The problem is well illustrated by laparoscopic cholecystectomy, which in Australia and New Zealand unlike other countries, was introduced within the College of Surgeons. The College's responsibility was to assess and then disseminate the new procedure to the community by training surgeons, yet at the same time minimize the risk to the community. The College defined criteria for performing laparoscopic cholecystectomy, facilitated workshops and defined how they should be organized, carried out a national audit of laparoscopic cholecystectomy and has subsequently set criteria for the introduction of advanced and other minimal access techniques. With the College delineating guidelines, individual institutions then had the responsibility of credentialling their surgeons. As it is impractical to credential for each individual procedure, the solution is to credential groups' procedures. Equivalent procedures are those in which what is achieved laparoscopically is the same as open, e.g. cholecystectomy (provided intraoperative cholangiography is still used). Alternate procedures are those in which the laparoscopic procedure is changed from the open procedure or the outcome is uncertain, e.g. bowel resection. These procedures should be limited to those undertaking them within an institutional trial or audit. Indifferent procedures are those in which existing surgical principles are not followed, e.g. laparoscopic inguinal hernia repair. These procedures should only be performed in a controlled clinical trial. New techniques and procedures can be introduced safely provided guidelines are established by the Colleges for institutions to act on. Audit by both is essential.

Key words: Laparoscopic cholecystectomy; credentialling

Professor Alfred Cuschieri at the 1993 Annual Scientific Conference of the Royal Australasian College of Surgeons described the development of laparoscopic general surgery as the 'greatest unaudited free-for-all in the history of surgery'. This is a lamentable truth but perhaps has not been so severe in Australia and New Zealand. This is perhaps due to the involvement of the Royal Australasian College of Surgeons from the begin-

ning of the general surgical laparoscopic revolution. This is unlike many other countries where the procedures started outside academia and the surgical mainstream, encouraged by commercial interests as well as media publicity and were indeed actively resisted by the surgical establishment.

The introduction of laparoscopic surgery, like the introduction of any new technology or procedure raises the issues: who should use it or do it? what training should they have? where should it be performed? what cases are appropriate? and how is outcome evaluated and who does the evaluation? Before the first laparoscopic cholecystectomy was performed in Australia at the Austin Hospital in February 1990, the President of the Australasian College of Surgeons was notified regarding the Professorial Unit's preparation. Appropriately, as the

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custodian of surgical standards in Australia and New Zealand, the College has been involved ever since.

Who should perform laparoscopic cholecystectomy and what training they should have was established by the College and published in the November 1990 College Bulletin; i.e. the person should have biliary surgical experience, laparoscopic experience and laparoscopic cholecystectomy experience, the latter in workshops plus clinical assisting experience as opportunities developed¹. The dilemma then was how to provide that experience for established biliary surgeons who were currently doing 30 000 cholecystectomies per year in Australia and New Zealand, as well as how to train the next generation of surgeons, the advanced trainees. Workshops were run throughout the country with outstanding cooperation and contribution from the country's experienced surgeons. These workshops were generally run under the auspices of the continuing Medical Education (CME) of the Royal Australasian College of Surgeons. The workshops' success was also dependent upon support from the instrument/equipment manufacturers. These workshops were not designed to be profit-making and the CME Committee carefully defined, in the College Bulletin, guidelines to ensure that the scientific content of the programmes was totally independent and that the financial aspects (i.e. profits if any) were appropriately dispersed for further education².

What cases should be selected for laparoscopic treatment resulted from discussion at such workshops and by the Upper Gastrointestinal Section of the College, a subgroup of the Division of General Surgery. Where the surgery should be performed was an issue initiated by those responsible for providing the funding, i.e. Government. It is a process in which the College is participating by laying down principles. It is clear that a surgeon and an institution should perform sufficient cases, first to maintain expertise and second to ensure efficient economic utilization of capital outlay for the equipment.

The College, in laying down guidelines regarding laparoscopic cholecystectomy and participating in the training process, then had a duty to evaluate the performance of that training. As a result, a national audit was coordinated and reported at the 1991 Annual Scientific Conference of the College in Sydney. Although questions remain as to whether adverse outcome was missed in this semi-voluntary audit, the result suggested minimal morbidity, with a bile duct injury rate of 0.2%, equivalent to the open procedure. Even though laparoscopic cholecystectomy was performed in selected (uncomplicated) cases, this appeared to be an acceptable outcome³. Subsequent audits and reviews, however, have suggested this injury rate may not be accurate^{4,5}. The rate of referral of major bile duct injury to specialist hepatobiliary surgical units has increased, for example to Professor Miles Little, Westmead Hospital, Sydney, it has increased 2.4-fold⁴. A study in New Zealand incorporating a voluntary audit as well as an audit of endoscopic retrograde cholangiopancreatography (ERCP) referrals, suggested that, overall, bile duct injuries actually occurred in almost 1%⁵. This suggests that either the original audit was incorrect or

that as the procedure became more widespread less experienced surgeons were causing more injuries. Both are perhaps true as injury rates are high early in a surgeon's experience⁶. However, quality of training does influence outcome in that in a US centre where surgeons had to be assisted by an experienced surgeon in their first 10 cases, in 511 laparoscopic cholecystectomies there were no duct injuries as compared to a 0.6% rate for the rest of the country⁷. Untrained surgeons learning as they go and thereby producing an epidemic of complications has led to governments and private institutions becoming involved in regulation and credentialling. In New York, the Department of Health banned laparoscopic surgery for a period as a result of the 7–15-fold increase in duct injuries. They rightly demanded that guidelines for training and credentialling be set by professional associations⁸. In London, a private hospital introduced its own credentialling for laparoscopic surgery after it found itself in court as co-defendant following a laparoscopic surgical death⁹. The latter, hospital credentialling is not only appropriate but essential. The former, government involvement in any aspect of surgical decision-making or practice, although necessary in this case, is a dangerous precedent. The initiative for standards of practice must be set by the custodian of standards, i.e. the College of Surgeons, with government and hospitals then using those guidelines for regulation and credentialling. Guidelines for credentialling are therefore essential and it is not sufficient to say that a Fellowship alone qualifies a surgeon to perform any procedure they wish. Unlike most other major developments in surgery, the laparoscopic revolution has required the learning of completely new skills^{10–12}.

The problem of training and credentialling becomes even more complex as the use of the laparoscopic is extended in both number of cases and types of procedures performed. At the Austin Hospital, Melbourne, for example, comparing two 12-month periods before and since laparoscopic cholecystectomy started, the number of cholecystectomies performed has more than doubled, which with an initial increased operating time per patient, resulted in a reduction of 12% of total cases performed. This increase in cholecystectomy reflects increased referral, not altered indications for cholecystectomy. By the end of 1992, the role of the laparoscope had expanded such that 14% of all non-day case surgical procedures were being performed laparoscopically. Note, interventional laparoscopic procedures are not yet being performed on a day case basis in Australia. This change in practice clearly has implications for theatre and ward design, hospital budget allocation, as well as surgeon, nurse and technician training and possibly type of surgical discipline. A suggestion however that a speciality of laparoscopic surgery develop should be resisted at all costs to prevent surgeons being reduced to mere technicians.

Should credentialling apply to each and every one of these new procedures? To attempt to do so might create the following problems. First, restrictive credentialling guidelines by those who assume themselves to be in a position to create them might result in accusations of turf

protection. Such an example is the flexible endoscopy guidelines laid down unilaterally by the Gastroenterology Society of Australia. This newly formed Society was rightly concerned about the growth of gastro-intestinal (GI) endoscopic procedures, the training of those who were performing it and thus the safety and productivity of these procedures. Naïvely, they set a rigid criteria for endoscopic procedures, including specific and arbitrary numbers, without consultation with the custodians of standards, the Royal Colleges. The College of Surgeons was rightly concerned that the guidelines would mean even fewer surgeons practising GI endoscopy. First, this was because some hospitals concerned about the legal implications acted immediately on these guidelines and removed privileges from surgeons for whom endoscopy had been part of their practice for years but who were not in a position to document their original training. Second, because some medical gastroenterology units refused to train surgeons, ultimately this would have meant even fewer surgeons trained to the arbitrary standards and therefore credentialled to perform the procedures. The belated establishment of a tripartite endoscopy recognition (not credentialling) committee of the Colleges of Surgeons, Physicians and the Gastroenterology Society has partially resolved the issue. The second problem of restrictive credentialling guidelines is that they may be inappropriately used as a legal precedent in a malpractice suit. Fulfilling numbers of cases is a measure of experience, not necessarily competence, some surgeons learning laparoscopic cholecystectomy in five cases whilst there are others who will never learn. It is necessary for Hospital Credentialling Committees using College guidelines to identify the latter.

The opposite end of the credentialling spectrum is to have loose or no guidelines at all. The problem then is that the public at large may be put at risk as each surgeon learns from the experience of their own complications. It is preferable, as new procedures develop, that the numbers of patients exposed to possible risks be minimized by investigating the procedure in controlled trials in a limited number of appropriate institutions. If found to be safe and effective, the most appropriate technique can be disseminated to the rest of the profession. An example of the implications of this approach, laparoscopic hernia, is given below.

Irrespective of the guidelines established, the development of new procedures raises the question of informed consent. Every patient should be told the presumed benefits of a new procedure, the known or predicted complications and their possible incidence, the alternative therapies available and their risks and benefits, as well as the individual surgeons' experience.

A compromise between these two extremes of guideline establishment for credentialling may be to group procedures together as suggested by Cuschieri at the 1993 Annual Scientific Congress of the Royal Australasian College of Surgeons. The first group of procedures might be defined as equivalent procedures, i.e. those in which what is achieved laparoscopically is exactly the same as was achieved in the open era. Individual surgeons should

be responsible for auditing their own experience. An example is laparoscopic cholecystectomy, provided intraoperative cholangiography is performed. This was the standard of care in Australia and New Zealand in the open cholecystectomy era, 87% of cholecystectomies having an intraoperative cholangiogram¹³. It is no longer the standard, only 23% of cholecystectomies now have an intraoperative cholangiogram, instead ERCP usage has increased 43% whilst endoscopic sphincterotomy has increased 242%¹³. The abandonment of the surgical principles that all stones, gallbladder and bile duct, be diagnosed and dealt with at the same procedure cannot be justified on the basis of the additional risk of these alternative procedures¹³. The second group of procedures are alternative procedures i.e. those in which the laparoscopic procedure is new or changed or in which there is some uncertainty of outcome or place. Such procedures should only be carried out in an audited environment or clinical trial. An example is colon resection. Guidelines laid down by the Colorectal Section of the Australasian College clearly define principles of, indications and contraindications for laparoscopic treatment as well as the role of audit of outcome.

A third group of procedures might be defined as indifferent procedures. These are procedures in which existing surgical principles are not followed or there is no attempt to reproduce that which was achieved in the open era. An example is laparoscopic inguinal hernia repair. If the two criteria for performing a procedure laparoscopically are accepted i.e. that the pathology be safely and effectively managed with laparoscopic instrumentation and that the major morbidity of the procedure replaced was the wound of access, then laparoscopic inguinal hernia repair simply defies logic. Although controlled clinical trials of the procedure are in process, there has to date been no published data of outcome confirming benefit. Despite this, laparoscopic hernia repair was widely practised. This practice was based on published or presented clinical reports of personal series, all self-assessed. Scientifically, these reports are valueless. In the interim, the next best source of data is prospective clinical series, independently assessed.

Such a series was presented at an Australia update of endosurgery at Hamilton Island, Queensland, July 1993, sponsored by Monash University Melbourne. Of 232 consecutive patients, at follow-up, recurrence for indirect hernia use was 4% whilst for direct hernias it was 40%¹⁴. This is 3–30 times worse than could be expected from open hernia repair¹⁵. Further, a potentially local-anaesthetic day-case procedure was converted to an inpatient general anaesthetic case with its associated cost and risk. Of more major concern were the reports of complications such as ruptured bladder (1.3%), hernia through the cannula sites (1.7%) and nerve injury (2.3%). Even more disturbing still, as a result of the peritoneal cavity being entered, was the predictable occurrence of adhesional small intestinal obstruction at 0.5% in the short follow-up period of 12 months. This is likely to be four times greater in the patient's remaining lifetime. Adhesions account for 75% of all small bowel obstructions with a 10–15% mortality¹⁶. In Australia, 40 000 inguinal

hernia repairs are performed every year. The estimate was that 5% were being performed laparoscopically in an uncontrolled manner by individual surgeons. Currently, there are three clinical trials being undertaken of open vs. laparoscopic hernia repair in which it is calculated that 110 patients are required in each arm to determine whether there are differences in immediate morbidity, hospital day stay and return to work. Table 1 demonstrates the reduction in exposure to the risk of complication, reduction in recurrence and reduction in long term small bowel obstruction between the three Australian clinical trials vs. 5%¹⁴ of the population being experimented on in an uncontrolled manner. With a six-fold greater number of recurrences and bowel obstructions as well as the still-unanswered question as to the value of the procedure, it is clear that indifferent procedures should not be performed at all in the wider community. Those who believe that such procedures do have a role have a duty to prove it in a controlled clinical trial. Fortunately, as a result of such meetings in Hamil-

Table 1. Laparoscopic hernia: the effect of clinical trials on risk reduction

	At 2 years	
	Recurrence	Bowel obstruction
Open access, 40 000/year 5% done laparoscopically	400	10–40
Controlled trials (3) 330 cases	66	1.6–6.4

The figures are based upon an independently assessed Australian audit of laparoscopic hernia¹⁴, i.e. 4–40% recurrence rate, 0.5% initial bowel obstruction rate which might increase four-fold in the patients' lifetime. Numbers in the controlled trials are based on three Australian trials with requirement in each that 110 be in the laparoscopic hernia arm.

ton Island, the number of hernias being performed laparoscopically in Australia has declined sharply.

To conclude, the introduction of new technology such

Table 2. The Royal Australasian College of Surgeons¹⁷ policy on credentialling for and training in new technology or procedures

Credentialling

Delineation of privilege should be determined by a credentialling committee set up by the governing body of the hospital. Credentialling committees should consist of medical practitioners only, and they should include a representative of the College, who is not a member of the hospital staff.

Surgical privileges should be individual-specific, and based upon criteria which include:

1. The individual's curriculum vitae
2. Fellowship of the Royal Australasian College of Surgeons or an equivalent diploma with approved training (the FRACS diploma in a surgical discipline should not necessarily imply competence in every procedure of that discipline; a Credentials Committee might reasonably require additional evidence for privileges to practise in certain areas of the discipline).

Guidelines for Fellows

Fellows wishing to utilize new technology and/or to undertake new or as yet unproved procedures should:

1. Obtain appropriate training and experience in the particular field of surgical practice under consideration.
2. Become knowledgeable in the technology and obtain appropriate experience in the use of the new surgical techniques or technology to be employed.
3. Participate in training courses relating to the new technology and/or procedure(s) when these are available.
4. Demonstrate a satisfactory acquisition of relevant technical skills by assistance at procedures undertaken by a surgeon experienced in the field of practice, and subsequently seek the assistance of such a surgeon during the initial operations of that type, performed by him/her.
5. Follow specific guidelines of a College Division or Section relevant to the procedure(s).
6. Undertake an on-going audit of indications and outcomes of procedures personally performed and to participate in hospital/region/College-based audits of aggregated data.
7. Participate in peer review.

College

To assist Fellow gain appropriate knowledge and experience, the College will:

1. Ensure that the training programmes and examinations for Fellowships include due consideration of the requirements of new technology.
2. Encourage the development of special centres suitable for training in new technology and related procedures. The essential requirement is that such centres are established under the guidance of reputable Fellows, knowledgeable in the field and with experience and acknowledged skill in the procedures. They should be supported with adequate facilities and sufficient staff to enable them to teach surgical colleagues, to assess the technology and to evaluate the procedures.
3. Encourage courses in new technology and related surgical practice to be conducted by appropriate centres.
4. Encourage new procedures to be evaluated initially in specialized units prior to their wide adoption throughout the surgical community.
5. Facilitate the performance of the required audits and peer review.
6. Be advised by the Surgical Boards, the Endosurgery Group, and other specialized groups which may be established by Council on progress and problems associated with the introduction of new technology into surgical practice.

as laparoscopic cholecystectomy illustrates the problem of bringing a new technique to the community yet at the same time minimizing the risk to individuals in that community. It raises the issues of how to evaluate and confirm the benefits of the technology, how to train existing surgeons if the procedure is confirmed to be of value and how to train the next generation of surgeons. The custodians of standards of practice have a duty to prevent an unaudited free-for-all. In Australia and New Zealand, the Australasian College of Surgeons has attempted to lay down guidelines and introduce training for laparoscopic cholecystectomy. As potential laparoscopic applications have been developed, it has laid down broad principles applicable to new technology which furthers science and safeguards the public (Table 2). Within this framework more specific guidelines for individual procedures are being produced. Under these guidelines, individual hospitals are in a position to credential surgeons to practise their art safely and governments are in a position to provide appropriate and adequate facilities and regulate a cost-effective health service. With economic pressures demanding even greater economies, combined with the development of anaesthetic/analgesic techniques and minimal access surgical technology, shorter stay surgery will expand even more in the future. It is hoped that the lessons learnt from the introduction of laparoscopic general surgery will better prepare us for the introduction of the next revolution, whatever and whenever it might be.

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Future developments in urologic day surgery

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This study was performed to assess the changes occurring in the field of urology with developments in outpatient surgery during a five year period. Using ICD-9-CM code, data for all urology procedures performed in the main operating rooms, day surgery, and laser center operating rooms of a large general hospital was collected for the years 1987–92. A substitution index (SI) was determined as the ratio of the number of outpatients to the total number of procedures and expressed as a percentage. Changes in the SI reflect the degree to which emphasis has shifted from conventional inpatient to outpatient surgery. Twenty-six per cent of urology procedures were being performed on an outpatient basis in 1987, and this increased to 42% by 1992. When broken down according to organ, the greatest increase in SI from 1987–92 was for the kidney (57%) and the least, the penis (2%), with ureter, urethra, testes and scrotum all revealing intermediate, but significant, increases (27%, 28% and 24%, respectively). This paper demonstrates that, as in other fields, urology has experienced a marked increase in outpatient surgery. With developments in surgical and anesthetic techniques, financial pressures, changing physician and patient attitudes and technological advances, further increases in urology outpatient care can be expected.

Key words: Urologic surgery, outpatient

Introduction

Major changes have occurred and are occurring in health care delivery, and urology has certainly been in the forefront of these developments, especially with increasing utilisation of outpatient surgery^{1,2}. About 10–15 years ago the only urology procedures routinely being performed on an outpatient basis were cystoscopy, vasectomy and circumcision. Virtually all other renal, bladder, urethral, scrotal and penile procedures were done on an inpatient basis.

About 8–10 years ago several publications described modifications of techniques so that the majority of scrotal and penile procedures could be performed on an outpatient basis. At that stage it was suggested that with improving technology, other diseases such as benign prostatic hyperplasia, renal calculi and stress incontinence may also be managed largely on an ambulatory basis^{1,2}.

This paper analyses changes that occurred at a large private hospital during a five year interval, so that this

may help to predict future developments in urologic day surgery.

Materials and methods

The hospital, as of 1993, is a 962 bed hospital with 21 main operating rooms, and 21 day surgery/laser rooms. A Same Day Surgery Center was opened in 1986 and therefore January 1987 was chosen as the starting point. Computerised data for all urology procedures performed in the main operating rooms, day surgery and laser center operating rooms were collected for the years 1987 and 1992. These were coded using the standard ICD-9-CM procedure codes and included all procedures performed on the kidney, ureter, bladder, urethra, prostate, penis, testes and scrotum. The number of procedures performed as an outpatient, inpatient and total was assessed. Following the recommendations of Colomer et al., a substitution index (SI) was determined and expressed as a percentage. The substitution index is the ratio of the number of outpatient procedures to the total number of procedures performed within a given time and expressed as a percentage $SI = \text{Outpatient}/\text{total} \times 100$. The changes in the SI thus reflect the degree to which emphasis has shifted from conventional inpatient to outpatient treatment on a broad basis and also for a given procedure³.

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Table 1. Site of urology procedures 1987–92

	1987 (n)	1992 (n)	% Change
Inpatient	3496	3261	↓ 6.1
Outpatient	1227	2343	↑91
Outpatient % of total procedures (SI)	26	42	↑16

Results

Overall in 1987, 4723 urology procedures were performed, of which 3496 were inpatient and 1227 outpatient, i.e. 26% of total procedures were performed on an outpatient basis (SI = 26%). In 1992 the total was 5604 procedures with 42% being done on an outpatient basis (SI = 42%). The absolute number of inpatient procedures thus decreased 6.1% whereas outpatient procedures increased by 91% compared to 1987 (Table 1).

When the procedures were broken down according to organ, there was an overall increase in both numbers of outpatient procedures performed and the SI. The greatest absolute increase in the SI from 1987 to 1992 was for the kidney (57%) and the least the penis (2%). Ureter, urethra, testes and scrotum revealed increases in outpatient procedures of 27%, 28% and 24%, respectively (Table 2). Overall numbers of inpatient procedures generally decreased except for the kidney, penis and prostate which increased 36%, 1% and 11%, respectively, whereas outpatient numbers increased in all from 10% for the bladder to more than 140-fold for the kidney (Table 3).

Discussion

The field of urology has contributed significantly to the development of outpatient surgery^{1,2}. In 1992 42% of all urology procedures were being performed on an outpatient basis at a large hospital with an established Same Day Surgery Center. This compares to the national average for all surgical procedures of 50%. Thus from 1987–92 there had been a greater than 90% increase in the absolute numbers of urology procedures being performed on an outpatient basis. Colomer et al. reported from Spain that the overall SI for all operations from 1990–92 was 48%, with urology showing the highest value of all specialties of 80%³. This high figure in their study is primarily due to the fact that only in recent times were circumcision, vasectomy and cystoscopy being done on an outpatient basis, whereas there has been a longer tradition of this at other centers.

Despite the marked increase in outpatient surgery, a significant number of procedures at our hospital were still being performed on an inpatient basis in 1992. It is suggested that minor changes in patient and doctor attitudes, as well as surgical and anesthetic techniques may permit many of these to be performed on an ambulatory basis.

There appear to be four main reasons for the develop-

ment and increase in outpatient surgery in all fields, especially in urology, namely financial incentives, advances in surgical and anesthetic techniques, developments in technology and changes in attitude.

Financial factors have been a major incentive towards outpatient surgery. In a recent survey, hospital CEOs predicted that outpatient services will account for nearly half of hospital net patient revenues by the year 2000⁴. Leading factors contributing to this increase in outpatient care are Medicare, prospective payment and an increasing reliance on managed care plans which encourage, presumably, less expensive outpatient services⁵. It has been shown that outpatient surgery costs 40–60% less than the same procedure performed on inpatients^{6,7}. Patients benefit directly from reduced costs for those self-pay procedures such as vasectomy reversal, which may not be covered by health insurance and indirectly from reduced time off work.

An important recent development in anesthetics is the use of the rapid short acting anesthetic agent propofol, often used in conjunction with the more established agent fentanyl^{8,9}. Propofol is a new intravenous hypnotic agent. Its major advantage is that it produces hypnosis rapidly and smoothly, usually within 40 s from the start of the injection and there is rapid recovery from anesthesia. These new agents, together with developments of techniques for local anesthetic nerve block greatly facilitate outpatient surgery^{10,11}.

Many surgical procedures in urology have been adapted to being better performed on an outpatient basis, including vasovasostomy, hydrocelectomy, spermatocelectomy, penile prosthesis, varicocelectomy, orchiopexy, bladder neck suspension and even transurethral resection of the prostate^{6,12,13}.

Technological advances are also contributing significantly to patients being managed on an outpatient basis. The most stunning of these are the developments for treating urinary tract calculi. A decade ago virtually all renal and ureteral calculi were managed with either open or endourologic procedures requiring days or weeks of inpatient care. In the current series 83% of extracorporeal shockwave lithotripsy (ESWL) and 53% of ureteroscopic calculus removal was performed on an outpatient basis, the remainder requiring only short periods of hospitalisation.

Treatment of benign and even some malignant disease of the prostate is also moving into the realm of outpatient surgery with advances in stents, laser prostatectomy, hyperthermia, pyrotherapy and brachytherapy^{16–21}.

One of the most significant reasons for the increase in outpatient surgery is the changing attitudes of patients, surgeons and administrators. It is now realised that all gain when a procedure can safely be performed on an outpatient basis. Patients benefit because the experience is much more pleasant and positive than being admitted to a hospital. They appreciate the greater accessibility of many of the units, the scheduling convenience, friendliness of the staff, quality of care, savings and early return to work. Surgeons benefit by working in an environment basically designed for healthy patients. They enjoy prac-

Table 2. Total urology procedures by organ

Procedure	1987			1992			Absolute change in SI (%)
	Inpatient	Outpatient	SI (%)	Inpatient	Outpatient	SI (%)	
Kidney	222	3	1.3	302	429	58.7	↑57
Ureter	183	33	15.3	122	90	42.2	↑27
Bladder	968	794	45.1	735	870	54.2	↑9
Urethra	271	109	28.7	215	282	56.7	↑28
Prostate	567	101	15.1	629	219	25.8	↑11
Penis	1206	54	4.3	1220	79	6.1	↑2
Testes & scrotum	79	133	62.7	58	374	86.6	↑24

Table 3. Percentage change in number of procedures by organ over the period 1987–92

	Inpatient	Outpatient
Kidney	36%↑	> 140 ×
Ureter	33%↓	173%↑
Bladder	24%↓	10%↑
Urethra	21%↓	159%↑
Prostate	11%↑	46%↑
Penis	1%↑	181%↑
Testes & scrotum	27%↓	117%↑

ting quality care in a pleasant environment, as well as the time saving afforded by close scheduling and minimal paperwork. Medical administrators are realising the tremendous cost savings and financial benefits of outpatient surgery.

It is thus predicted that in the future there will be an even greater utilisation of ambulatory surgery facility by urologists. This will come about because of increasing financial pressures, advances in surgical and anesthetic techniques, developments in technology and changes in attitudes of both patients and urologists. As Jarrett has stated "By the end of this century, the question will not be whether a patient is suitable for treatment on an ambulatory basis, but whether there are any indications for admission"²².

Acknowledgements

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The growth of day surgery in Australia: the role of the Australian Association of Day Surgery Centres

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This paper describes the origins of the Australian Association of Day Surgery Centres, its structure, its objectives and the services provided to its members. The paper traces developments in the Australian healthcare system to explain the background against which the Association has evolved, outlines its current operation and indicates the future directions the Association will take. It concludes that there is a strong need for the Association to network with other day surgery organizations in South-East Asia, Europe and North America, to develop a stronger link for the interchange of ideas, data and experience, and to advance the cause of day surgery as a safe, convenient and cost-effective alternative to inpatient hospitalization.

Key words: Australia, day surgery organizations, international links

Despite the trend towards shorter hospital stays generally, there was little formal government support for day surgery in Australia until the early 1980s, when the medical colleges started to take an active interest. In 1981, a joint working party on day surgery (comprising the Royal Australasian College of Surgeons, the Australian Association of Surgeons, the Faculty of Anaesthetists of the Royal Australasian College of Surgeons and the Australian Society of Anaesthetists) devised a set of guidelines for day surgery, including recommendations on appropriate and inappropriate procedures, physical facilities and staffing, and surgical and anaesthetic standards¹.

The report of the working party was sent to the minister for health in the hope that it would encourage the development of a positive government stance and the provision of incentives for an increase in day surgery. Although a number of recommendations were made, it was not until 1985 that day surgery started to increase more rapidly, in response to a statewide dispute in New South Wales between the medical profession and the government which resulted in the institution of financial incentives through the development of a new 'single day' hospital benefit. This in turn led to a rapid increase in the number of free-standing day surgery units.

Nevertheless, there was still no legislation in many states to enable a patient health insurance benefit to be paid to cover the cost of using a day surgery facility. Detailed submissions to the federal government (also referred to as the Commonwealth government) were required, and special regulations were needed to enable some day surgeries to be eligible for payment of these benefits. One of the results of the difficulties experienced at this time was the development of a working relationship between many of the early day surgery facilities, which culminated in the formation of the Australian Association of Day Surgery Centres (AADSC).

The Association was loosely formed in late 1987 by these early licensed free-standing day surgery centres in Australia, at a time when day surgery accounted for about 18% of all surgery performed in public and private hospitals. These original members were all privately owned multi-specialty units spread across four states (New South Wales, Queensland, Victoria and Western Australia). The oldest of them had been commissioned in 1982 at Dandenong in Victoria.

The original objectives of the Association were: (a) to promote the concept of resource-conscious quality healthcare; (b) to remove any discrimination against day surgery centres in state or federal legislation; (c) to define and promote standards for day surgery; and (d) to support the registration of day surgery centres.

Day procedure lists

In 1987, a meeting was convened by the Commonwealth Department of Community Services of Health and the

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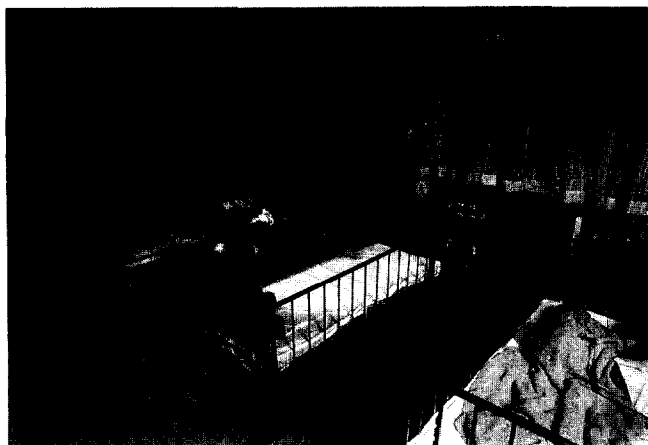


Figure 1. Paediatric day surgery unit in Perth.

proprietors of eight private free-standing day surgery facilities, to discuss (*inter alia*) the schedule attached to the ministerial determination of 28 October 1986 relating to the day hospital benefit and a number of anomalies which had been identified, most importantly the anomaly which meant that the 'exclusion schedule' (a list of procedures that were excluded from attracting a health insurance benefit if performed in day surgery units) did not apply to hospitals. Examination of this exclusion list resulted in a number of 'excluded' items being reinstated for benefits.

Later in 1987, the Australian Health Ministers' Conference agreed there should be a review of day-only procedures, a more uniform method of payment implemented to apply equally to day surgery performed in free-standing facilities and private hospitals, and a review of the current practice of payment of an inpatient hospital bed stay benefit for procedures listed for exclusion from the day hospital benefit.

Legislation to effect this uniformity was passed through federal parliament in the Autumn session of 1987, which empowered the Commonwealth minister for community services and health to make determinations in respect of professional attention: type A, requiring overnight stay; type B, requiring hospital/day surgery facility treatment but not an overnight stay; and type C, not requiring hospital/day surgery facility admission. The legislation removed the requirement that a patient occupy a 'bed' in order to qualify for the day facility benefit.

In December 1989 the Commonwealth introduced differential levels of benefit in the form of a 'banding system', whereby procedures were allocated to different bands depending on the anaesthesia and time in theatre. These bands therefore attempted to reflect more closely the complexity of the procedure, e.g. longer general anaesthetic procedures were allocated to a higher band, thus attracting a higher benefit. At the same time, the Commonwealth gave a commitment to review the arrangements after 12 months.

This spurred the AADSC to become more formally established with a constitution, secretariat and access to

a lobbyist, particularly as there was a need to address continuing anomalies in the system with disadvantaged day-only facilities. July 1990 became a watershed for the AADSC.

The Commonwealth Review of Day Only Arrangements was subsequently undertaken in 1991, to which the AADSC made a formal submission. The submission included comments on the increase in day surgery, the impact on quality of care, standards (including registration and licensing), further development, inclusion of non-surgical procedures, exclusions, administrative arrangements and incentives. At the Commonwealth's request, the AADSC also commented on a range of issues outside the terms of reference for the review. This review led to a streamlining of the administrative arrangements.

In July 1992, the AADSC approached the Commonwealth about the exclusion list of procedures and in particular about the need to review the description for certain item numbers.

International links

In early 1991, the AADSC made contact with the British Association of Day Surgery and subsequently started to seek links with other day surgery organizations, with the objective of canvassing interest in establishing international standards for day surgery centres. In late October 1992 a member of the AADSC was invited to serve on the editorial board of *Ambulatory Surgery*. Dr Greg Wotherspoon was appointed as the Association's nominee on the editorial board.

Reimbursements for day surgery fees

The AADSC was successful in overcoming attempts by a major private health fund to exclude dental surgery anaesthesia items from being done in day surgery, since

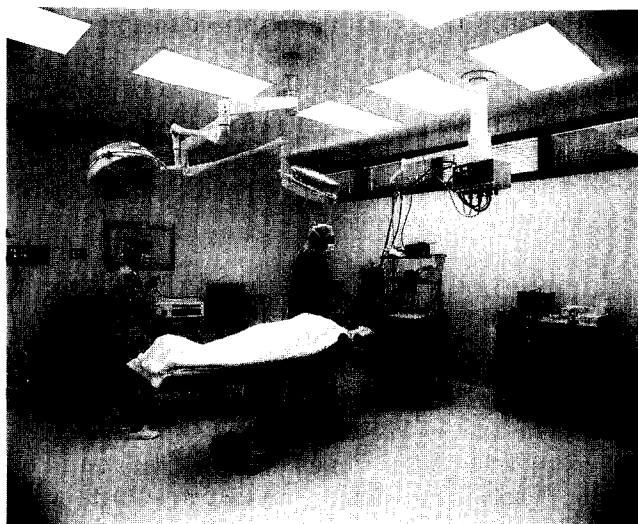


Figure 2. Well equipped and modern day surgery theatre at Hornsby Day Surgery Centre.

Table 1. Australian Association of Day Surgery Centres: admissions 1991–92

<i>Admissions</i>	<i>Average</i>
Weekly	60
No. of procedures per theatre (per week)	27
No. of procedures per theatre (per annum)	1381

Table 2. Australian Association of Day Surgery Centres: type of anaesthesia administered in 1991–92

<i>Anaesthesia</i>	<i>Percentage of cases</i>
Nil	< 1
Local	24
General	48
Regional	
block	1
IV sedation	8
Neurolept	10

On average, 0.2% of patients were subsequently transferred or discharged to hospitals.

they were concerned that overall benefit payments would increase if there was a bigger shift of such procedures to day surgery, believing that these items should be performed in dental surgeries. A submission was made in February 1991 to obtain inclusion of dental surgery procedures and anaesthesia into the banding system for surgery benefits. Around this time, the AADSC and its members had significant input into the federal government review of day-only arrangements for payment of basic table private health insurance, following submission of a paper which had been extensively researched by AADSC. The basis of the association's argument was on the grounds of patient safety and standards; it advocated that such cases must be performed in appropriate facilities.

The AADSC also assists members with problems resulting from the payment of benefit levels by health insurance funds, especially where a member facility may be being disadvantaged or the application of benefit arrangements is inconsistent.

Data collection

In late 1991, the AADSC was involved in refining the Australian Bureau of Statistics (ABS) survey of day surgery facilities, as the ABS had assumed responsibility for data collection from the Commonwealth Department of Health, Housing and Community Services. Data were also collected from the members of the association and aggregated for circulating back to members for their information (Tables 1, 2).

Information services

The association's secretariat disseminates a variety of information to members, including abstracts, newspaper cuttings, background information on developments affecting healthcare and changes to state and federal legislation concerning day surgery.

Education

Meetings devoted to day surgery in Australia are now beginning to be held, but the International Conference and Exhibition on Same Day Surgery (hosted by the Perth Surgicentre and endorsed by the AADSC) was the first truly practical meeting. The AADSC will be involved in the organization of national events and will be largely responsible for organizing the second International Conference in Melbourne in 1995.

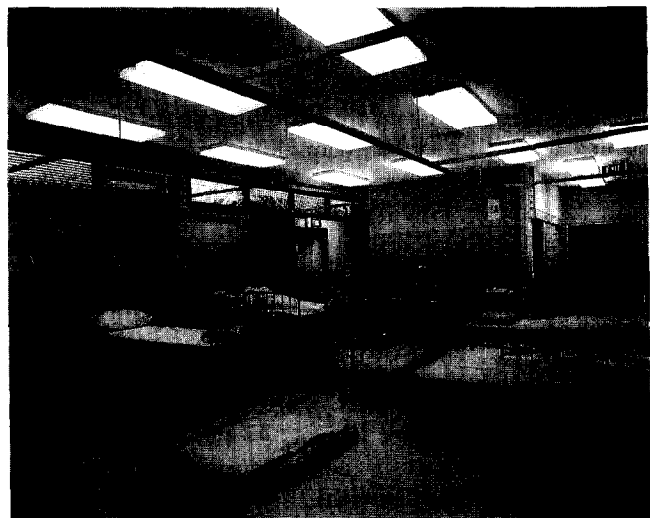
Current membership

This comprises facilities all across Australia with over 150 people – owners, doctors, administrators and nursing staff – working directly to deliver day surgery services.

Licensing

The AADSC has been active in supporting stringent standards being applied to any facility in which surgery is undertaken.

In early 1993, the AADSC challenged the New South Wales Department of Health over its temporary licensing of facilities unable to comply with new licensing legislation. This required any facility offering anaesthesia beyond simple sedation for surgery or endoscopy to be licensed. The Association's view was that temporary licensing was effectively lowering standards. At the same time, it potentially provided a "windfall" gain in patient benefits for facilities that were little more than "doctors'

**Figure 3.** Recovery area at Hornsby Day Surgery Centre.

rooms/surgeries". As a consequence, the Department of Health decided to review the guidelines and address quality assurance in day procedure centres. The review involved representatives from the Australian Medical Association, the Gastroenterological Society of Australia, the Royal Australian College of Ophthalmologists, the Royal Australian College of Obstetricians and Gynaecologists, the Royal Australasian College of Surgeons, the Australia and New Zealand College of Anaesthetists, the Royal Australasian College of Physicians and the Australian Association of Day Surgery Centres.

More recently, the Association has approached health departments in a number of states where existing day surgery legislation was leading to the registration of inappropriate facilities. Currently the AADSC is responding to draft licensing guidelines from the Department of Health in Victoria, thereby continuing to be active in lobbying for improved standards and monitoring legislative and regulatory changes.

Quality and standards

The AADSC is represented on the expanded National Day Surgery Committee, which comprises a wide range of medical organizations, including the clinical colleges. The Association has been involved with the Australian Council on Healthcare Standards to establish appropriate standards for day surgery facilities, to which input to subsequent reviews has been continuing. More recently, advice was sought from the AADSC on developing objective measures of care in free-standing day surgery centres. In this particular case, the measures of care were clinical indicators, a list for which was put forward (Table 3).

Conclusion

The Australian Association of Day Surgery Centres has evolved against a climate of change within the healthcare system which has seen day surgery gradually become more accepted in Australia. Accelerated growth in day

Table 3. Australian Association of Day Surgery Centres: clinical indicators for day surgery

Procedure cancelled on day of surgery due to:
– patient non-compliance
– patient unfit on day
– poor selection or unsuitability of patient
Patient returned to theatre
Infection requiring admission to hospital (within 24 hours of procedure)
Unanticipated prolonged stay in recovery
Unanticipated admission
Postoperative morbidity:
– vomiting (> 20% of cases)
– headache
– drug reaction

surgery is predicted and the AADSC is positioning itself to meet these changes.

The aim is to improve communication between the people involved in day surgery throughout Australia, including the various special interest groups that have been formed in various states. In addition, the Association will seek to establish links overseas with New Zealand and South-East Asia, as well as to build on existing contacts with day surgery bodies in the UK, USA and Europe. The exchange of information and ideas and the development of international codes of best practice are essential for wider acceptance of day surgery.

A bright future for the new Association is predicted, with its practical approach offering assistance and advice to members operating day surgery services. The Association will be actively promoting increased growth in day surgery as a positive means of helping to reduce overall costs of healthcare, while focusing on the quality of patient care.

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The Commonwealth Government and day surgery in Australia

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The Commonwealth Government of Australia has taken an active role in promoting day surgery. In this paper I will outline the present situation before outlining the future direction of day surgery in Australia.

Australia's healthcare system

A federal system of government exists in Australia. Under the Constitution, the Commonwealth has legislative power over health insurance. In addition, the Medicare agreements with the states and territories have enabled the Commonwealth to oversee the provision of a universal scheme of healthcare. The relevant Acts are the National Health Act 1953 and the Health Insurance Act 1973. States retain the residual power over health services.

All Australians have equal access to basic healthcare needs under Medicare. Every Australian has the choice, on admission to a public hospital, of electing to be treated as a Medicare patient or as a private patient. Medicare patients receive accommodation and medical treatment by hospital-appointed doctors without charge. Private patients are responsible for the payment of both the hospital charges and doctors' fees for medical services, subject to insurance rebates. The main purpose of maintaining private health insurance is to obtain benefits towards costs associated with services and facilities not available under Medicare, such as doctor of choice in hospital, preferred levels of hospital accommodation and coverage for ancillary services such as aids and appliances.

The Commonwealth does not exercise any controls over private hospital facilities. They are autonomous organizations, recognized for insurance benefit purposes,

and free to set their own fees. At present, some public and private hospitals have day surgeries geographically within the hospital, while a number of free-standing private day surgeries exist.

Unlike the United States, Australia treats day surgery patients as hospital patients. As a consequence of being administratively treated as a hospital patient, the public patient in a day surgery centre receives treatment free of charge. A private patient receives benefits under the health insurance basic table to cover day surgery costs, plus amounts from Medicare and the private health insurance funds to cover the scheduled fee for doctors' services.

A health insurance basic table (regulated by the Commonwealth Government) is primarily designed to cover public hospital charges for same-day or overnight shared ward accommodation as a private patient. However, the basic table also applies to private hospitals and day hospital facilities, although patients who utilize private facilities tend to purchase a level of insurance beyond the basic table, as the charges raised by private facilities are usually higher than the benefits contained in the basic table. This additional insurance is not regulated and health insurance organizations are free to set their own conditions.

Day surgery in Australia

Although day surgery, as such, has been undertaken in hospitals for some time, it was not until the early 1980s that this delivery of healthcare became formalized in Australia. In 1980 the Royal Australasian College of Surgeons and the Australian Association of Surgeons, together with the Faculty of Anaesthetists of the College and the Australian Association of Anaesthetists, estab-

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lished a working party on day surgery, which published its first manual of standards in 1981.

1982 saw the first private free-standing hospital facility opening in Australia and since then there has been a spurt of growth in this area and there are now 101 such facilities operating throughout the country.

The College of Surgeons' working party has increased in size and membership and today is known as the National Day Surgery Committee. This Committee has provided much valuable advice to the Commonwealth and continues to do so. A list of its members is in the Appendix.

The Commonwealth Government is keen to encourage the greater use of day surgery in those cases where it is clear that it is a safe and effective alternative to overnight hospitalization. As always, the Commonwealth's prime concern in the provision of health services is the needs of the patient. The Commonwealth considers that day surgery offers significant benefits to many types of patient and is particularly beneficial to children, who no longer have to undergo prolonged separation from their family in times of illness. Day surgery also offers the opportunity to free hospital beds for those people awaiting more complicated surgical procedures and requiring longer-term hospital care. Of course, we are not averse to the obvious potential reduction in healthcare costs either!

The Commonwealth's commitment to and recognition of the value of day surgery has been demonstrated in two major ways. The first is through the basic table of private health insurance, which affects privately insured patients in both the private and public hospital sector. The second is through the Medicare agreements, specifically the Medicare incentives package.

Basic table and day surgery

Through the private health insurance sector, and with the potential benefits of day surgery in mind, in December 1989 the Commonwealth Government introduced the day arrangements into the health insurance basic table by amendments to the National Health Act 1953. These arrangements provide for differential levels (bands 1-4) of facility benefits from the basic table. The benefit for the top level (band 4) is equal to the overnight basic table benefit. This new costing structure provides financial incentives for hospitals to use day-only surgery rather than admit patients for a night in hospital.

The legislation provides for three kinds of professional medical attention. The type A list consists of professional attention that would normally require overnight hospitalization. The type B list comprises procedures that should be done on a day-only basis. The exclusion list, known as the type C exclusion list, identifies procedures that should not require hospitalization. This has been a crucial element in endeavouring to ensure that the growth in the use of day surgery occurs from transferring overnight hospitalization to day procedures and not from services normally rendered to hospital outpatients or in doctors' rooms. However, the system is flexible,

allowing a doctor to certify that a patient who would normally fall within the exclusion list should actually be treated in the day surgery sector. A similar certification process occurs in moving a day surgery patient to overnight hospital care.

Full details of the day-only arrangements are available in the Day Only Procedures Manual, which is published by the Department of Human Services and Health. Copies of the manual can be obtained by writing to the Health Insurance Section, Department of Human Services and Health, PO Box 9848, Canberra ACT 2601, Australia.

Medicare agreements

The second field where the Commonwealth has shown strong support for day surgery is in the Medicare agreements. The Medicare agreements contain the same day-only arrangements that exist for private patients – that is the banding arrangements and the type C exclusion list and certification. This means that these arrangements are now the same for both public and private patients throughout Australia.

For some years now the Commonwealth and states have used the Medicare agreements to encourage greater efficiencies in the public hospital system through substitution of in-hospital effort with more cost-effective treatment modes. Since 1988, the Medicare incentive package (MIP) has targeted three areas: day-only procedures, early discharge for post-acute patients and community-based palliative care services. The day-only component of the MIP has been aimed at encouraging day surgery in the public sector and the provision of medical services on a day-only basis. From 1988/9 to 1992/3, the Commonwealth spent \$58 million on 65 projects concerned with the development of day procedures. These projects used funds to:

- initiate dedicated programmes for day procedures;
- purchase capital equipment; and
- promote day surgery through the designation of dedicated space for either theatres, recovery, or patient administration, or additional dedicated sessions.

Earlier this year, MIP was subjected to formal evaluation by an independent consultant. The evaluation report noted that over the first four years of the five-year programme:

- 28% of the day procedure projects were mainstreamed to become part of normal hospital practice; and
- the funded day surgery projects that are most effective are those in which day surgery is provided in dedicated or 'stand-alone' facilities.

The consultant observed that, to be effective, a dedicated operating theatre would need to perform around 1500 cases a year. The comparable figure for an endoscopy room was projected at around 2000 cases per year.

In 1991/2:

- there were 1 300 966 day-only admissions to hospitals in Australia, including 831 277 admissions to public hospitals and 469 689 admissions to private hospitals; and
- of the 831 277 admissions to public hospitals, 632 502 were public patients (76%), 188 284 private patients (23%), and 10 491 compensables and ineligible patients (1%).

Commonwealth/state support for day surgery and the provision of medical services on a day-only basis is to continue over the five years of the current Medicare agreements. It is projected that over the next four years, the Commonwealth will spend about \$55 million on day surgery projects.

Future directions

Magazine/journal articles

The Department of Human Services and Health envisages using 'user-friendly' articles in weekly magazines and journals and other forms of media publicity to inform health administrators, hospital executives, nursing and ancillary staff and patients of the benefits of day surgery.

It is essential that patients, in particular, are made aware of day surgery and its potential benefits. Moreover, many doctors need to be informed of the option of day surgery and the certification requirements that go with it. Review of the day-only arrangements has revealed medical practitioners' reluctance to complete paperwork.

23-hr hospital patients

The Department is also aware that many patients who have day surgery are hospitalized overnight purely because the surgery was scheduled for late afternoon. The Department appreciates that not all day surgery can be scheduled to ensure that patients are discharged on the same day.

To counter this, the Commonwealth is considering creating a short-stay category of private patient. This patient would spend less than 24 hr in a facility and be designated a day patient and day facility benefits paid accordingly. If successful it can be expected that the category will also apply to public patients.

Early discharge for post-acute patients

The Commonwealth is particularly interested in programmes which will demonstrably reduce lengths of hospitalization, without jeopardizing patient health or disadvantaging patients in any other way. In 1992 the Department supported a pilot early discharge programme under the health insurance basic table, which aimed to return patients to the familiarity and comfort of their own homes shortly after hospitalization – safe in the knowledge that professional nursing support was readily available for home treatment.

The pilot programme, run by a private organization, was expected to run for 18 months but only lasted for 6 months. The reasons cited for the reduced length of the pilot programme included a lack of cooperation by certain medical specialists.

Despite the limited success of the 1992 pilot programme, the Department has a continuing interest in supporting these and other types of innovative programmes (e.g. recovery care centres) and would consider introducing a basic table benefit for such services. Such programmes would provide a support system for more involved day surgery.

Basic table changes

The basic table will have to change its shape to take the casemix initiated diagnostic related groups (DRGs) into account. It may also be affected by the current Commonwealth Government review of the health insurance arrangements. We do not know precisely what the basic table will look like in the future, but you may be sure that there will be plenty of health industry consultation before the final table is introduced.

Ambulatory care

In July 1993 the Australian Health Ministers' Conference (AHMC) agreed to start a process of ambulatory care reform in the public hospital system. Ministers endorsed a two-year research and development programme to develop an agreed framework for the organization, delivery and funding of hospital-related ambulatory services.

The ambulatory care research programme objectives are to:

1. Develop an agreed conceptual framework for the operation of hospital-based ambulatory services which:
 - (a) take account of the relationship between costs and services across inpatient, outpatient and community services;
 - (b) promote continuity of patient care by encouraging coordination of services over an episode;
 - (c) safeguard teaching and research;
 - (d) reduce incentives for under- and over-provision;
 - (e) continue the tradition of convenient patient access to a broad range of services; and
2. Within the agreed framework, undertake pilot projects for each state to gather essential information and test new approaches for counting, classifying and paying for hospital ambulatory services.

Key features of the ambulatory care framework will be tested and developed over the next two years, through the Ambulatory Care Research and Pilot Programme. The programme is currently at an early stage, with most of the first year research projects expected to commence in January 1994.

Distinct day surgery services will be identified through the research programme, but are not considered to be within the scope of ambulatory care services. This is due to the fact that day surgery is regarded as an inpatient service in Australia.

Application of new technology

The creation of new technology such as keyhole surgery (new laparoscopic techniques) and more refined anaesthetics can only improve the provision of day surgery.

Conclusion

The Commonwealth is involved in day surgery in both the public and private spheres of healthcare. The Government's establishment of the Medicare incentive package and its regulation of the basic table has encouraged the growth of an alternative to overnight hospitalization. With the cooperation of the states, the medical profession and with the guidance of an expanded National Day Surgery Committee, this encouragement should see the further expansion of day surgery centres. The Commonwealth is also eager for other early discharge programmes to be initiated.

Early discharge programmes contain advantages for all involved in the provision of medical treatment. Patients have the option of staying in their home environment instead of an alien hospital environment. Moreover, the risk of cross-infection is avoided. Hospitals have an increased throughput. However, the Com-

monwealth's continued support for day surgery and its future expansion is not simply idealistic, it is also financial. The patient will not be forced to incur the cost of spending the night in hospital when it is not necessary or desired. With such advantages on all sides, the continued growth of day surgery is assured.

Appendix – National Day Surgery Committee

- Australian Association of Surgeons
- Royal Australasian College of Surgeons
- Australian and New Zealand College of Anaesthetists
- Royal Australian College of Obstetricians and Gynaecologists
- Otolaryngological Society of Australia
- Royal Australian College of Ophthalmologists
- Neurosurgical Society of Australasia
- Australian Society of Plastic Surgeons
- Australian and New Zealand Association of Urological Surgeons
- Australian Orthopaedic Association
- Australian Association of Paediatric Surgeons
- Australian Dental Association
- Australian Medical Association
- Australian Private Hospitals Association
- Australian Health Insurance Association
- Health Insurance Commission (Medibank Private)
- Australian Hospital Association
- Australian Association of Day Surgery Centres
- Gastroenterology Society of Australia

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Some economic aspects of day surgery

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This paper highlights certain economic aspects of day surgery that need to be considered when changing to this form of treatment.

Key words: Economics, day surgery

This paper makes no pretensions to being all-embracing. Neither does the author claim to be an expert in the field, though he takes comfort in this respect from Hubert Humphrey's remark that he learnt more about economics from one South Dakota dust storm than he did in all his years in college. The aim is to highlight certain financial aspects that need to be considered when changing from inpatient to day-case surgery.

Average unit cost comparisons

Most of the papers on the economics of day surgery have compared the average unit costs of day surgery to inpatient surgery. Savings of between 19 and 70% have been reported for day surgery¹⁻⁵. There are a number of reasons for this variance. Different individual or groups of surgical procedures have been looked at. The studies have spanned some 15 yr and during this period the average length of inpatient stay has steadily fallen. The areas of costs examined have varied and no study has covered them all. In particular, capital cost comparisons have not been undertaken. All these studies show is that day surgery has a lower average cost than inpatient surgery but by what amount is uncertain.

Cost changes substituting day surgery for inpatient surgery

There is a concept that activity is inversely proportional to cost and that the unit cost, at any level of activity, for day surgery is less than that for inpatient surgery. On this basis the transfer of cases from inpatient to day-case

work results in an increase in inpatient unit cost, a decrease in day-care unit cost and an overall saving. Clearly this is over-simplistic. At very low levels of day-case activity, for instance, the few cases being treated are carrying the full fixed costs and thus the unit cost for day cases might exceed that for inpatients. In this situation a transfer of a small number of cases from inpatient to day care would result not in overall savings but in overall increased costs. Equally the concept of a straight line inverse relationship between unit cost and activity is misleading. This only pertains between critical activity levels. The true relationship is a series of straight line slopes joined by intermittent steps. These steps are against the direction of the slopes and occur as staff are taken on or laid off, or facilities are opened or closed as critical activity points are reached.

Perhaps the easiest way to understand the relationship is to use the simile of a jumbo jet. Before one passenger can be carried there are fixed costs to be met including the capital cost of the plane and the staffing costs of the pilots and the minimal number of cabin crew to meet safety regulations. The same crew can handle, for sake of argument, up to 60 passengers. As the number of passengers increases to this figure the unit cost per passenger reduces on a straight line basis until over 60 passengers need to be carried. The number of cabin crew must then be increased to cope with the increase in passengers. Unit costs suddenly increase and then fall again on a straight line basis as passenger numbers grow until further cabin crew are required. This pattern continues until the jumbo jet is full and minimum unit cost is achieved. A second plane is then required to handle further passengers. There is then a sudden and large rise in unit cost, though not to the level at the outset of the first plane, as the total costs are spread over the passengers in the first full plane and the second plane. This over-simplified description perhaps highlights areas to be looked at when relating volume to cost.

The above descriptions do not, however, take account of case mix but rather assume that all cases attract the

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same cost. Initially when cases are moved over to day surgery the inpatient case mix is little affected but as day surgery grows the majority of the more straightforward cases are removed from inpatient care, leaving increasingly more complex cases which are more costly to handle. The rise in inpatient unit costs therefore becomes steeper than it was at the outset of the move to day surgery. Conversely, in time more major cases become day cases and at this point the fall in average day surgery unit costs flattens out or may even rise.

Some of the cost effects of a change from inpatient to day surgery may now be considered.

Capital costs

The cost of building an inpatient unit to handle a given number of cases is more than that of building a self-contained day unit to deal with the same number of cases. The theatre costs of the two will be the same but the ward area in a day unit is less complex and is smaller as patients spend less time in a day unit than an inpatient ward. Thus more patients can be dealt with in a given area in a day unit and consequently the capital cost of providing ward accommodation in a day unit is considerably less than it is in an inpatient facility.

In most instances, however, the choice is not between building an inpatient facility or a day unit. More commonly an inpatient facility already exists and a new self-contained day unit is required. The choice is then between converting an old building and erecting a new building or possibly a combination of the two. Areas available for conversion may not be ideally situated in the hospital, design compromises may be required to fit an existing shell and the potential for future expansion may be limited. These factors may lead to increased revenue costs when open and a reduction in service quality. A conversion is, however, frequently cheaper than a new building though this is not always the case. A new building should achieve the ideal design from the point of view of efficient running costs and quality of services. It can also be designed for possible future expansion.

However, when moving from inpatient to day surgery work not only should the capital cost of developing the day unit be considered but also the effect the move has on existing inpatient capital investment. As day-case activity increases and inpatient work falls inpatient ward and theatre facilities will become surplus to requirements. The capital cost of these facilities still has to be serviced, unless they are over 50 yr old and have been written off or they can be sold. Capital costs can be transferred if their use can save building a necessary new facility.

All the factors mentioned above must be considered and financially modelled prior to the development of a new day unit.

Nurse staffing costs

Inpatient nursing costs are not saved by a transfer of inpatient work to day surgery until a critical number of

inpatient beds can be closed. On a 30-bedded ward about six beds must be closed before savings on day nursing salaries accrue and 15 beds must close before the night nursing salary bill can be reduced. As the lighter cases are increasingly treated as day cases, unit nursing costs for the remaining inpatients are increased as a higher nurse/patient ratio is required.

Nurses in day units in the UK only work weekdays between 8 a.m. and 6 p.m. and units close on bank holidays. Clearly costs are less than for providing inpatient nursing care 24 hr a day 365 days a year. Salary bills can be minimized and job satisfaction increased by training staff in day units to be multiskilled. That is, every nurse is trained to work in the ward area, assist anaesthetists, scrub in theatre, recover patients and give advice to patients and relatives. They can also be instructed in assisting in patient selection, thus releasing time spent by junior medical staff.

The lack of antisocial working hours and the good use that can be made of part-time staff in a day unit makes staff recruitment easier than for inpatient work⁶. This, combined with the experience of many day units that staff retention is better than for inpatient wards and theatres, results in reduced personnel costs.

Other costs

Unit medical staff costs may be slightly lower in a self-contained day unit as there is some evidence that a greater number of cases can be undertaken in a given period of time than when the same cases are dealt with on an inpatient basis^{7,8}. Theatre disposables, dressings and analgesic costs are the same for day cases as inpatients. Day-case anaesthetic drug costs are often said to be higher than those for inpatient surgery. Perhaps this reflects a willingness to compromise quality for cost benefits in inpatient anaesthesia. Laundry costs are likewise similar but catering costs for day surgery are less. The costs of other services such as heating, lighting, maintenance and cleaning are less per case treated in a day unit than in an inpatient unit, as more cases are treated in a smaller area.

Careful consideration must be given to the apportionment of a hospital's central overheads between the inpatient and day-care units. Such costs may include those for general management, finance, marketing, training, personnel, etc. Day units on hospital sites are often loaded with more than the correct percentage of these costs. This is reflected in studies which have shown the cost of day surgery treatment in free-standing units to be less than that of self-contained units on inpatient hospital sites⁹. Day units on hospital sites may also be burdened with paying a disproportionate part of the cost of certain 24-hr services such as portering, communications, pathology and radiology.

It is understandable that managers of hospitals with both inpatient and day-case facilities should try to spread their costs to make the inpatient ward more competitive.

However, for prudent management the true cost apportionment must be known so that the financial viability of both the inpatient and day units can be determined. The move to day surgery and the consequent reduction in inpatient work, albeit more complex, may reduce income to below the critical level to sustain quality inpatient services and essential 24-hr overhead costs. If this point is reached consideration must be given to closing the inpatient facility or merging it with another.

Admission, readmission and complication costs

The cost of treatment in any area should include the cost of dealing with any problems that might arise as a result of that treatment. Admission costs only apply to day surgery though perhaps inpatient care beyond the projected time of discharge should also be considered. Admission rates for day surgery of between 0.7 and 6%^{10,11} have been published and the average length of inpatient stay is just over 1 night.

Readmission rates following inpatient or day surgery for the same procedure seem similar and run between 0.3 and 2.8%¹². Likewise complication rates for day surgery are no greater than for inpatient surgery⁹.

Transferred costs

Costs are variably incurred by the community and primary healthcare services and/or the patients and their relatives before, during and after hospital treatment. The term transferred costs has been given to the costs, previously met by the hospital, incurred by the above following day surgery. Clearly such costs should be included in the total treatment cost but this should not be confined to day surgery but also included for inpatient work, particularly in view of the ever-reducing length of inpatient stay. Perhaps these costs should be termed non-hospital costs.

In the 1970s considerable use was made of community nursing services following day surgery and it was estimated that this accounted for 12% of the savings made from changing treatment to day care¹³. More recently the Audit Commission⁸ reported little use of such services. At present some day units are considering employing their own community nurses who can be targeted on the few cases that require this service.

General practitioner contact following day surgery is reported at between 3 and 9%^{14,15}. No study has compared community and general practitioner involvement following inpatient and day-case surgery for the same procedure.

Studies from North America show savings to patients and their relatives from a move to day surgery^{4,16}. Loss of earnings for relatives caring for patients at home, travelling costs to and from the hospital and the speed of return to work of the patients are some of the factors that need to be taken into account. Further work is required in this area.

Conclusion

It is impossible to generalize about the level of savings that may accrue from a move to day surgery. Indeed it may well be that in the short term a transfer to day surgery may increase the total cost of patient treatment to a hospital and in the long term potentially make a hospital's inpatient unit non-viable. Despite this, provision of day surgery may well be essential to a hospital's survival. Increasingly patients are asking for day-case treatment and purchasers and funders of health care are contracting for this form of treatment. For a hospital not to provide this service will in the longer term lose it this increasing share of the market. Hospitals have to decide whether an investment in day surgery is or is not worthwhile in view of their long-term business strategy, and in line with this decide how to handle the resulting increase in the unit cost of inpatient care.

These decisions can only be made on the basis of detailed financial analyses and projections, paying attention to the areas discussed above and modifying or adding to these as local circumstances dictate.

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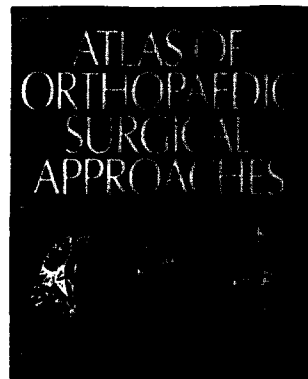
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Potential economic impact of expansion of same-day surgery in Australia

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Same-day surgery (SDS) is not new. In 1909 Nicoll and Glasq published their results on over 9000 surgical procedures in the *British Medical Journal*¹. What is new in the international hospital literature is the rate of growth of SDS in different sites, the effects of this growth on future planning for traditional inpatient beds and operating theatres, and the renewed interest of health economists in the safety, efficacy and cost-effectiveness of specific surgical procedures performed as SDS and/or associated with lasers and using endoscopy²⁻¹¹. This paper reviews (1) the current use rates of SDS services in Australia, (2) trends in SDS in the USA that have some relevance for Australia, (3) some potential economic benefits of expansion of SDS, and (4) the reforms in supply-side and demand-side mechanisms that are required in Australia if the share of SDS in all surgery is to increase to proportions now observed in US surgical services.

Key words: Same-day surgery, health economics, reimbursement methods, technology assessment, cost-effectiveness

Table 1. Growth of same-day procedures by hospital type, Australia, June 1989 to June 1993

	Day procedure units	Public hospitals	Private hospitals	Total
Quarter ending June				
1989	8115	31 578	43 787	83 480
1990	12 252	37 894	60 347	110 493
1991	17 340	40 233	70 999	128 572
1992	19 072	40 134	75 226	134 432
1993	21 312	39 554	81 044	141 910
Growth rate p.a. (%)	27.3	5.8	16.6	14.2
Market share				
1989	9.7	37.8	52.6	100.0
1993	15.0	27.9	57.1	100.0

Same-day surgery in Australia

Australia is a nation of nearly 18 million people, and 8.6% of its gross national product is spent on healthcare. Roughly 46% of that expenditure occurs in acute general

hospitals endowed with 4.4 acute beds per 1000 population, with about 80% of the beds and bed-days being in public hospitals. Those beds are used at a rate of just under 1200 bed-days per 1000 population, due mainly to an admission rate of around 22%, one of the highest in the OECD nations.

Table 1 indicates the growth of SDS procedures in Australia from June 1989 to June 1993. Over that period, the annual growth rate of SDS was 14.2% in all acute hospitals and significantly higher in private hospitals. In the three major sites of SDS, the market shares changed significantly in that period, with under-capitalized public

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Table 2. Projection of supply of 'core' beds and day-only beds, NSW, 1990–2001 (source: NSW HSRG, March 1993)

Type of service	Beds			Bed-days		
	1990	2001	% change	1990	2001	% change
Core service	23 338	22 239	– 4.7	6 198 000	5 522 000	– 10.9
Day-only services	138 454	249 442	86.2	70 740	127 765	80.1
Total	NA	NA	NA	6.270	5.650	– 9.9

Table 3. Variations in length of stay, day stay and preadmission days, HCF, 1993 (source: HCF Annual Report 1993)

Procedure	Length of stay (days)		Percent day stay		Percent presurgical days	
	Average	Range	Average	Range*	Average	Range*
Knee arthroscopy	0.9	0.5–1.8	51%	5–100%	NA	NA
Cataract removal	1.5	0.5–2.6	22%	0–100%	52%	0–85%
Herniorrhaphy	3.7	2–5	1.2%	0–12%	54%	31–85%
Prostatectomy	4.9	3–8	NA	NA	72%	50–96%
Hysterectomy	7.7	6–13	NA	NA	72%	43–100%
Tonsillectomy	1.4	1–3	1.5%	NA	26%	0–60%
Varicose veins	3.2	1–6	3%	0–17%	61%	40–94%

*Ranges for per cent day stay and per cent presurgical days are for major hospitals representing 50% of fund's payout.

hospitals either lacking the necessary resources or the surgical leadership to match the growth spurt of SDS in the other two sites.

In 1990/91 in the public hospitals of the largest state, New South Wales (NSW), 25% of all separations were from SDS services. The highest shares of SDS in the state's surgical services were for male sterilization (85%), other red cell disorders (78%), myringotomy with tube insertion (77%), and vaginal, cervical and vulvar procedures (75%). In the period 1988/89 – 1991/92 in NSW public hospitals, the largest growth rates in separations occurred in general surgery (22% per year), medical oncology (12%), dialysis and respiratory medicine (each about 8.5%), cardiology (7.5%), infectious diseases (7%), and neurology and orthopaedics (each 6%), the overall annual growth rate being 12.9% in that period. 66% of all additional separations in public hospitals in the period were due to the growth of day-only surgical and medical services.

In NSW private hospitals in the same period, the overall annual growth rate of separations was 39.7%, with the largest annual growth rates occurring in general surgery (31%), obstetrics (8%), and orthopaedics, psychiatry and gastroenterology (each about 6%). 77% of all additional private hospital separations in the period were due to the growth of day-only services.

In NSW, these changes in market share and volume growth have led the state's health planners to conclude that between 1990 and 2001, the supply of beds and bed-days in 'core' hospital services and in SDS services will decline as shown in Table 2, with significant declines in both beds and bed-days in the core hospital services, 80% growth rates in day-only services, and a 10% decline in all bed-days in the forecast period.

For at least two reasons, these estimates understate the likely decline in acute beds and bed-days that are likely to occur by 2001. First, health insurance funds have commenced the long overdue task of utilization review of hospital services, creating in the process new databases that reveal some disturbing variations in hospital stay. For Australia's fourth largest health fund, Table 3 illustrates some inexplicable differences in three key variables affecting the costs of seven common surgical procedures, i.e. the average length of stay (ALOS), the share of SDS in all surgical services, and the proportion of all surgical days that involved a presurgical stay in hospital. There may be valid reasons for these variations – but at the very least they require some careful scrutiny by the Royal College, teaching hospitals and individual surgeons.

Second, SDS services will be influenced by the expansion of high-tech home healthcare, early discharge programs and case management, all of which are causing significant reductions in the total number of acute bed-days worldwide¹².

Trends in SDS in other nations: the USA as bell-wether

For historical, technological and reimbursement reasons, the US health system is a bell-wether of technological change in surgical services. There are three major sites of SDS in US healthcare: (1) hospital outpatient departments, (2) freestanding ambulatory care facilities (e.g. ambulatory surgical centres (ASC), comprehensive outpatient rehabilitation facilities, diagnostic imaging facilities, lithotripsy and dialysis centres), and (3) private doctors' offices. Table 4 shows the growth rates of ambulatory surgery from 1984 to 1992.

Table 4. Percentage growth of market shares in ambulatory surgery USA, 1984–1992

Site of services	1984	1988	1992
Hospital outpatient department	84.7	79.3	72.9
Ambulatory surgical centre	7.9	13.8	17.2
Doctor's office	7.4	6.9	9.9
Total	100	100	100

Outpatient departments

The significant decline in the rate of growth of procedures in hospital outpatient departments has been offset by growth rates in procedures in the ASCs' and doctors' office. Some major causes of the absolute growth in US outpatient surgical procedures in the period 1983–1992 include development of shorter-acting anaesthetics (such as propofol), the rapid diffusion of less invasive surgical procedures that have reduced the need for inpatient care (due mainly to the introduction of arthroscopes and laparoscopes), and the evolution of new cataract surgery procedures causing less trauma and patient risk. Cataract removal is the most frequently performed outpatient surgical procedure funded by Medicare in the USA (roughly 750,000 procedures in 1990, and a growth rate of 52% in the period 1988–1990). In 1990, the scope of SDS procedures performed in US outpatient surgical units was wider than in most other nations and the rate of growth of some outpatient surgical procedures in the period 1988–1990 was unmatched elsewhere (Table 5).

One economic outcome of a growth in outpatient surgical services has been the increased share of total hospital revenue generated from outpatient services. In the period 1980–1991 as the number of outpatient surgical procedures grew from 3 million to 12 million, total revenue growth in US outpatient services came 20% from higher utilization and 35% from greater intensity and complexity of outpatient services.

Ambulatory surgical centres

Three major causes of the increase in ASCs have been US federal government legislation in 1982 allowing payments of medical facility fees to ASCs, expansion by the Health Care Financing Administration of the list of procedures for which ASCs could receive a facility fee, and liberalization or elimination of certificate of need requirements that had impeded ASC creation or expansion. As a result, between 1963 and 1991 the number of ASCs in the USA increased from 239 to 1556, and the number of ASC procedures from 377,000 to over 2.5 million, with ophthalmology, gynaecological and ENT procedures constituting 55% of all ASC procedures.

The overall effect of these changes in surgical care in the USA has been quite profound. In the period 1980 to 1992, while the number of inpatient admissions and bed-days fell 14.1% to 19.1%, respectively, and the number of emergency department visits and other outpatient

visits rose 17.5% and 103.7%, respectively, the share of outpatient surgery in total surgery rose from 16.3% in 1980 to 53.8% in 1992.

Economic impact of the evolution in SDS

The measurement of the full economic effects of the transition to SDS is conceptually quite difficult, although many studies have compared different measures of cost of SDS against the costs of traditional surgical services.

The economic appraisal of new medical technologies such as SDS usually involves one of three methods: cost minimization analysis, cost-effectiveness analysis and cost-utility analysis. Having regard to the typical flow of patients in SDS (Figure 1), three sets of costs (direct, indirect, and 'psychic') are relevant to all three methods (Table 6).

If only direct costs are considered in the economic appraisal of two surgical interventions, one typical computation in cost-minimization analysis is:

$$C = C_T + C_C - C_{HC} \quad (\text{Equation 1})$$

where C = savings (or increase) in direct costs due to the new SDS intervention; C_T = difference in the direct costs of the two surgical treatments (e.g. SDS and traditional surgery), including bed stay, OR costs, lab costs and postoperative visits, as well as the additional costs of care provided in the home or community care settings by relatives, friends and volunteers; C_C = difference in the costs of treating any complications of the two treatments; and C_{HC} = difference in the costs of future health costs averted by the new intervention.

In cost effectiveness analysis (CEA), one typical computation used is:

$$C = \frac{C_T + C_C - S_{HC}}{LYS} \quad (\text{Equation 2})$$

where LYS = number of life-years saved by the new surgical treatment.

It should be noted that LYS is only one of many possible denominators for measuring the cost-effectiveness of a new surgical procedure against another intervention. The denominator measuring 'effectiveness' in a cost-effectiveness analysis (CEA) can vary with the surgical procedure and target site. Two equally tenable alternative denominators to LYS might be the percentage gain in weeks of pain-free living due to the new technique or the percentage increase in visual acuity associated with new types of cataract surgery. For some new surgical techniques, it is quite conceivable that while the procedure might cause savings in direct costs, in the early years of its diffusion along a learning curve it may increase morbidity or case mortality rates and thus reduce life-years. In the hands of an inexperienced surgeon, laparoscopic herniorrhaphy may be such an example in 1994².

Finally, if we adjust the LYS measure to incorporate measures of patient quality of life in the remaining years of life, the resulting cost-utility analysis (CUA) generates

Table 5. Hospital outpatient procedures responsible for largest proportion of charges, US Medicare beneficiaries, 1990 (source: ProPAC analysis of the 5% Hospital Outpatient Bill File from the Health Care Financing Administration. Includes ambulatory surgical centre-approved services only)

Procedure	No. of procedures	Percent change 1988-90
Cataract removed, insert lens	747 300	52
Diagnostic colonoscopy	289 120	121
Colonoscopy lesion removal	163 260	100
Upper gastrointestinal endoscopy, diagnostic	195 600	90
Secondary cataract laser surgery	170 760	103
Upper gastrointestinal, biopsy	164 900	111
Inguinal hernia repair	64 800	134
Cystoscopy	157 140	46
Colonoscopy and biopsy	112 280	113
Breast lesion removal	66 000	75
Wrist nerve tension	55 520	62
Kidney stone fragmentation	10 900	150
Breast biopsy	37 480	19
Dilation and curettage	37 760	50
Knee arthroscopy	18 320	63

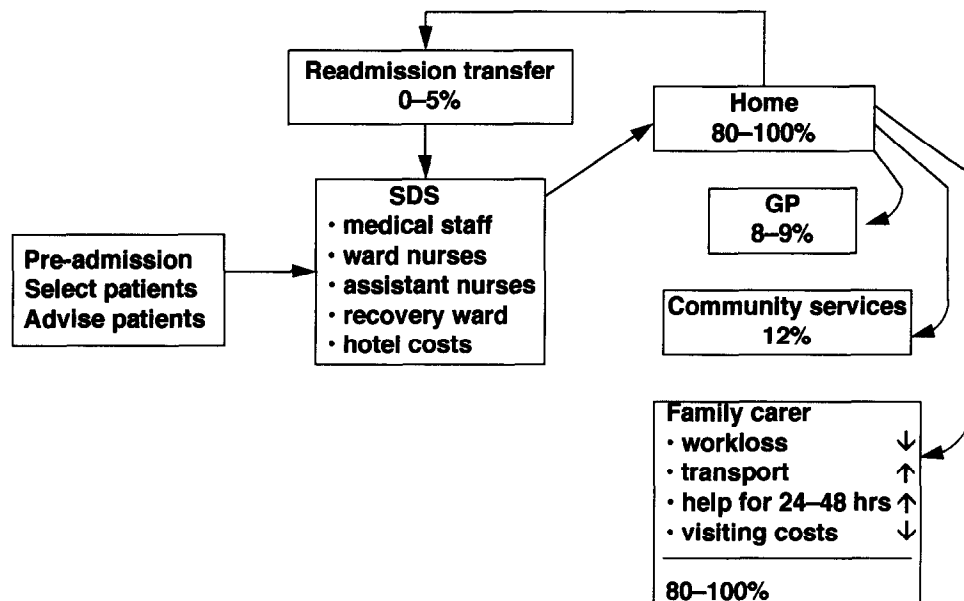


Figure 1. Typical flow of patients, same-day surgery

a cost per quality-adjusted life year (QALY) gained by the new intervention. The methodological problems of measuring quality of life (QOL) before and after surgical procedures are formidable and often not recognized by health economists unfamiliar with the desirable psychometric properties of QOL scales or the methods of validation of such scales. These limited insights are most evident when researchers attempt to rank different therapies by their cost per QALY³⁻²⁵. Comparisons of the benefits and costs of day surgery against traditional surgery abound²⁶⁻³⁴. A smaller number of studies have compared the costs of freestanding surgical units against ambulatory surgery within a hospital³⁵⁻³⁷. A well designed CEA comparing ambulatory surgery in an 'intermediate health unit' (or outpatient surgery hospital) against a traditional secondary hospital in Colom-

bia, South America, included a large range of measures of direct and indirect costs and some crude measures of health outcome³⁷. The average direct cost per non-recurrent elective inguinal herniorrhaphy was four times higher in the traditional hospital, and the patient and family gained at least six days from an ambulatory surgery procedure that took 26 minutes (compared with 37 minutes in the traditional hospital). This study comes closest to a model study of the economic impact of new surgical interventions.

Creating incentives for faster adoption of SDS in Australia

Policies to encourage faster adoption of new interventions including SDS usually focus on the supply-side of

Table 6. Relevant economic costs in different types of surgery

Direct costs
Diagnosis
Preadmission investigation
Operating room staffing
Surgical times
Recovery time
Preoperative and postoperative patient education
Supplies, particularly disposables
Treatment of side-effects
Care by informal carers of patient in the home
Indirect costs
Lost productivity
Lost days of work
Lost time of family and patient in travel to/from hospital
'Psychic costs'
Pain, stress, embarrassment
Quality of life measures

healthcare rather than on the demand side. A preoccupation with either supply-side regulation or incentives is evident worldwide.

Supply-side reforms

Until recently Australia had a negative list, i.e. a list of procedures designated by the Commonwealth government as not appropriate for SDS. At one stage in the mid-1980s, this negative list was almost as long as the positive list being used to encourage SDS in other nations. As indicated above, the US government encouraged the adoption of SDS by (1) deregulation of the sites of care in which SDS can be performed and (2) economic incentives in Medicare and Medicaid which encouraged patients and doctors to use less costly sites of care.

In Canada, the approach seems to be somewhere between the Australian negative list policy and the US positive list/incentives policies. In 1991, long after UK guidelines on day surgery were first published, a subcommittee on health program guidelines in Canada issued a set of guidelines on day surgery which identified a list of procedures that were known to have been performed as SDS³⁸. In 1993, the province of Saskatchewan released its discussion paper on minimally invasive therapy (MIT)³⁹. It provided some examples of MIT, focusing mainly on laparoscopic cholecystectomy, endometrial ablation, treatment of benign prostatic hyperplasia, and discectomy for herniated discs. It estimated that as much as C\$5.5 million could be saved each year in hospital operating costs in the province if a number of assumptions applied, including (1) a reduction of 50% of hospital days by substitution of laparoscopic procedures for open procedures; (2) replacement of 50–75% of hysterectomies by endometrial ablation; (3) reduction of 50% of hospital days by substitution of SDS for transurethral resection of the prostate (with no open prostatectomies replaced by SDS); and (4) reduction of hospital days for laminectomy if percutaneous discectomy was shown to

be effective. This paper also raised the thorny but critical issues of how to encourage the diffusion of SDS, the need to credential surgeons to carry out new procedures, and the need for careful patient selection if the SDS procedures were to be cost-saving.

The use of economic incentives on the supply side to encourage the diffusion of effective SDS is more evident in US health-financing strategies than in most other nations. Cataract surgery is one area where SDS rates vary widely from 20–25% in Quebec, to 80% in the UK to 95–100% in the USA⁴⁰. There are significant levels of agreement on criteria for measuring the appropriateness of cataract surgery⁴¹. Economic incentives are being applied in an HCFA-financed contract study of cataract surgery in five US sites starting in 1993. The particular economic incentive being evaluated is a single global fee for surgery, anaesthesia and hospital care, with the patient billed once for the global fee which covers pre-operative care, preoperative measurements, surgeons' fees and postoperative care for 120 days. This payment method is, in effect, a fee for case management designed to encourage high quality SDS for cataracts.

Demand-side reforms

The role of patients in the choice of surgical site has been investigated from at least two perspectives that are relevant if it is deemed socially desirable to increase the proportion of surgery undertaken as SDS. One study⁴⁰ found that even after controlling for patient and hospital characteristics, there was still a relationship between the likelihood of SDS for cataracts and the propensity of a surgeon to operate on an outpatient basis, challenging the basic belief that the choice of surgical site is based strictly on patient condition and the availability of hospital facilities. Focusing on the local situation in Quebec, the researchers indicated that 'since patient characteristics are not the sole factors in the choice of cataract management strategy, there is real potential, and this is confirmed by the practice in other countries, for expanding day surgery in Quebec'.

Another view, that informed consumers can determine both the rate and site of surgery, is supported by two recent initiatives in patient education for surgery. Kaiser Permanente (Denver) tested in a GP's office a video on benign prostatic hyperplasia (BPH) produced by the Foundation for Informed Medical Decision Making in New Hampshire. The showing of the video, which provides unbiased information on the risks, benefits and costs of nearly a dozen treatment strategies for BPH (based on data from an NIH Consensus Development Conference in the early 1990s), was associated with a 44% decline in the 'demand' for open surgery by Kaiser enrollees in a 12-month period. Unpublished studies by European researchers presented at the Health Economics Conference in Paris in December 1992 suggested that if patients are informed about the availability of less invasive procedures, they are more likely to demand them.

Conclusion

As in most other developed nations, Australia has not invested heavily in new types of information required to educate consumers about the benefits, costs and risks of different types of surgery, including innovations in SDS. Beyond incentives on the supply and demand sides to increase the share of SDS in all surgery, Australian health policy reforms in the mid 1990s will need to reduce a number of other barriers to diffusion of SDS, including:

- the lack of medical practice guidelines that could reduce complications and improve health outcomes
- perverse economic incentives in the financing of SDS which do not encourage alternative site therapy because health insurance funds pay higher benefits for more costly hospital care
- government policies which regulate the site and types of surgery and which do not fund home healthcare at adequate levels
- databases on use rates and costs of existing surgical practices which are often two years out of date when published, if published at all.

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3RD EUROPEAN CONGRESS ON AMBULATORY SURGERY

1ST INTERNATIONAL CONGRESS ON AMBULATORY SURGERY

MARCH 16TH - 17TH, 1995

BRUSSELS

Day care surgery will profoundly change the nature and scope of hospital medicine in coming years. More than 50% of surgical procedures are now feasible using this regime and, at certain centres in some countries, this proportion has already been achieved.

Eight hundred delegates from more than forty countries attended the 2nd European Congress on Ambulatory Surgery held in March 1993. The congress is the first and foremost worldwide platform on the subject of Ambulatory Surgery and an extensive programme is planned.

Topics:

- Current status of ambulatory surgery worldwide
- Advantages and disadvantages
- Development and organisation of a day hospital
- Information
- Education
- Medical criteria
- Standards for quality control
- Economic aspects
- Controversial issues
- Political perspectives
- Anaesthesia for ambulatory surgery
- Surgical specialities

Language:

The working language of the Congress will be English. Simultaneous translation will be available in French, German and Dutch.

If you are interested in participation in the Congress or in presenting a paper, please contact Dr Claude De Lathouwer, Brussels One Day Clinic, Avenue Duc Jean 71-73, 1080 Brussels, Belgium. Tel: +322 422 4271. Fax: +322 425 7076

Literature Review

Selected abstracts from the current literature

Propofol anaesthesia reduces early postoperative emesis after paediatric strabismus surgery

EJ Reimer, CJ Montgomery, JC Bevan, PM Merrick, D Blackstock and V Popovic

Can J Anaesth 1993; **40**(10): 927–33

Propofol anaesthesia may reduce postoperative emesis. The purpose of this study was to compare the incidence of emesis after propofol anaesthesia with and without nitrous oxide, compared with thiopentone and halothane anaesthesia, in hospital and up to 24 hr postoperatively, in outpatient paediatric patients after strabismus surgery. Seventy-five ASA class I or II, unpremedicated patients, aged 2–12 yr were randomly assigned to one of three groups: Thiopentone, 6.0 mg kg⁻¹ i.v. induction followed by halothane and N₂O/O₂ for maintenance (T/H); propofol for induction, followed by propofol and oxygen for maintenance (P/O₂); and propofol for i.v. induction, followed by propofol infusion and N₂O/O₂ for maintenance (P/N₂O). All received vecuronium, controlled ventilation, and acetaminophen pr. Morphine was given as needed for postoperative analgesia. There were no differences in age, weight, number of eye muscles operated upon, duration of anaesthesia or surgery. The P/N₂O group (255 ± 80 µg kg⁻¹ x min⁻¹) received less propofol than the P/O₂ group (344 ± 60 µg kg⁻¹ x min⁻¹) (P < or = 0.0001) and had shorter extubation (P < 0.001) and recovery (P < 0.01) times. Emesis in the hospital, in both the P/N₂O (4.0%) and P/O₂ group (4.0%) was less than in the T/H group (32%) (P < 0.01). Antiemetics were required in four patients in the T/H group (16.0%). Overall emesis after surgery was not different among the groups: T/H (48%), P/O₂ (28%) and P/N₂O (42%).

The use of propofol anaesthesia with and without N₂O decreased only early emesis. This supports the concept of a short-acting, specific antiemetic effect of propofol.

Comparison of ketorolac and opioid analgesics in postoperative ACL reconstruction outpatient pain control

DA McGuire, K Sanders and SD Hendricks

Arthroscopy 1993; **9**(6): 653–61

Pain control is an important postoperative consideration with any surgical procedure. Technological and procedural improvements have contributed to the reduction in both the

degree of surgical difficulty and the postsurgical complications associated with intricate surgeries. As a result, certain surgeries have potential for being performed on an outpatient basis, dependent upon appropriate pain-management regimens and the degree of potential for postoperative complications. Arthroscopic anterior cruciate ligament (ACL) reconstruction is a common procedure. Because of the reduction in invasiveness that arthroscopy provides, outpatient surgery is now routinely employed for ACL patients. The arguments against ACL outpatient surgery have included the reluctance to use ambulatory, indwelling, intravenous pain-pump delivery systems for opioid pain medication.

The purpose of this study was to determine the efficacy of a ketorolac tromethamine used for the management of the postoperative pain produced as a result of outpatient ACL reconstruction. When the ketorolac pain management regimen is compared in this setting with meperidine or morphine, pain control is as good as, or in some cases better than, either of the opioid drugs. Additionally, the adverse side effects associated with opioid drugs are significantly reduced at a substantially lower direct cost to the patient.

Use of mivacurium during laparoscopic surgery: effect of reversal drugs on postoperative recovery

Y Ding, B Fredman and PF White

Anesth Analg 1994; **78**(3): 450–4

We studied the influence of mivacurium on the recovery profile following outpatient laparoscopic tubal ligation in 60 healthy, nonpregnant women. After administration of midazolam 2 mg intravenously (i.v.), anesthesia was induced with fentanyl, 2 µg/kg, and thiopental, 4 mg/kg i.v. When the patient became unresponsive (loss of eyelid reflex), either succinylcholine 1 mg/kg, i.v. (Group I), or mivacurium 0.2 mg/kg i.v. (Groups II and III), was administered to facilitate tracheal intubation. Anesthesia was maintained with isoflurane (0.5%–2% inspired concentration) in combination with 67% N₂O in oxygen. Muscle relaxation was maintained in all three groups with intermittent bolus doses of mivacurium, 2–4 mg, i.v. In Group III, residual neuromuscular block was reversed with a combination of neostigmine, 2.5 mg, and glycopyrrolate, 0.5 mg, i.v., at the end of the operation. In the postanesthesia care unit (PACU), patients in Group III had a significantly increased incidence of postoperative nausea and vomiting compared to Group II. The use of succinylcholine (versus mivacurium) was also associated with more frequent postoperative nausea and vomiting. However, these emetic sequelae did not delay postoperative recovery times. In addition, a comparable number of patients in each treatment group required analgesic medication for postoperative pain. Although patients who received succinylcholine complained of significantly more neck pain during the 24-h period after discharge, nausea, vomiting, and shoulder pain were similar in all three groups during this period.

We conclude that neostigmine and glycopyrrolate may contribute to the development of postoperative emesis when used for reversal of residual neuromuscular block.

Are discharge criteria changing?

F Chung

J Clin Anesth 1993; 5(6 Suppl 1): 64S–68S

The safe and expeditious conduct of ambulatory surgical care can succeed only by careful selection of patients and surgical procedures, appropriate intraoperative and postoperative anesthesia care, and prudent and timely discharge of patients. Practical discharge criteria or a postanesthesia discharge scoring system should be implemented in every ambulatory surgery center to ensure safe recovery and discharge after anesthesia.

The PADSS is simple, practical, and easy to remember. It provides an uniform assessment of all patients, it may have added medicolegal value, and it establishes a routine of repeated reevaluation of home readiness. We recommend using the postanesthesia recovery score (Aldrete score) to evaluate the initial recovery of the patient. Once the Aldrete score is met, home readiness can be evaluated by the PADSS or modified PADSS. If the patient satisfies the criteria of the PADSS or modified PADSS, he or she can be discharged home. At the Toronto Hospital, we have discharged 30,000 patients home safely with the PADSS. However, any discharge criteria scoring system must be used with common sense and clinical judgment. Home readiness does not mean street fitness. Further studies on adverse outcomes after discharge and the return to normal function (e.g., work readiness) are warranted.

Recovery characteristics of desflurane versus halothane for maintenance of anesthesia in pediatric ambulatory patients

PJ Davis, IT Cohen, FX Jr McGowan and K Latta

Anesthesiology 1994; 80(2): 298–302

Desflurane is a new potent, inhaled anesthetic agent with low blood-gas solubility that should allow for the rapid induction of and emergence from anesthesia. However, its extreme pungency makes desflurane unacceptable for induction of anesthesia in children.

This study was undertaken to determine the airway properties of desflurane administered by mask after anesthetic induction with halothane and nitrous oxide, and to compare the emergence and recovery properties of minimum alveolar concentration (MAC)-equivalent concentrations of desflurane or halothane in nitrous oxide in pediatric patients undergoing ambulatory surgery. Forty-five children undergoing ambulatory surgery for inguinal hernia repair, orchiopexy, and/or circumcision were randomized into two groups. Both groups were premedicated with intranasal midazolam and given halothane and nitrous oxide by mask to induce anesthesia. A caudal block was placed in children in both groups after anesthetic induction. For maintenance of anesthesia, group I patients (n=22) were switched over to desflurane (1 MAC) and nitrous oxide, and group II patients (n = 23) continued to receive halothane (1 MAC) and nitrous oxide. All patients

breathed spontaneously throughout the entire procedure, and all anesthetics were terminated abruptly at the conclusion of surgery. Recovery indicators (time to first response, length of time in the recovery room and length of time in the hospital) and the quality of the anesthetic emergence were assessed by a nurse blinded to each patient's anesthetic. This observer was present with the patient throughout his or her ambulatory hospitalization and continuously assessed the recovery indicators according to preset criteria. The groups did not differ with respect to age, weight, or dose of midazolam.

Although group I (desflurane) had a longer anesthesia time (52 ± 12 min vs. 42 ± 10 min), their time to first response (9.5 ± 6.8 min vs. 20.9 ± 14.7 min) and their recovery room time (21 ± 10.7 min vs. 29 ± 14.6 min) were less than those in group II (halothane). There was a trend for patient emergence from desflurane anesthesia to be associated with a higher incidence of emergence delirium (50% vs. 21%).

The two groups were similar with respect to overall duration of postoperative ambulatory hospitalization. In children premedicated with intranasal midazolam, desflurane maintenance anesthesia allows for a faster recovery. However, depending on the institution's criteria for ambulatory surgical patient discharge, desflurane may or may not affect the overall hospitalization time.

Anxiety, relaxation and anaesthesia for day-case surgery

D Markland and L Hardy

Br J Clin Psychol 1993; 32(4): 493–504

It is recognized that pre-operative anxiety can have adverse effects on the course and outcome of surgery and there is a considerable amount of research into the influences of interventions for pre-operative anxiety on a number of post-operative variables. However, little attention has been paid to the potential influences of treatments on intra-operative variables, most notably on the facilitation of anaesthesia.

The present study examined the impact of a brief relaxation procedure on anaesthesia in comparison to attention-control and no-treatment control procedures. A sample of 21 patients were randomly assigned to one of the three conditions. It was found that the relaxation treatment significantly reduced pre-operative anxiety as measured by the state scale of the State-Trait Anxiety Inventory (Spielberger, 1983). This reduction was reflected in physiological indicators of anxiety.

Both the relaxation group and the attention-control group required significantly less time to induce anaesthesia and less of the anaesthetic agent used to maintain anaesthesia. The relaxation group also scored significantly lower than the no-treatment control group on an anaesthetist's rating of difficulty of maintenance of anaesthesia. Whilst the relaxation treatment appeared to have no advantages over the attention-control procedure in anaesthetic requirements, the latter did not reduce anxiety and showed no benefit over the no-treatment control condition in terms of an anaesthetist's rating of difficulty of maintenance of anaesthesia. Following recovery, the relaxation group reported more favourable perceptions of treatment than the attention-control subjects.

Impact of newer drugs and techniques on the quality of ambulatory anesthesia

PF White and I Smith

J Clin Anesth 1993; **5**(6 Suppl 1): 3S–13S

Recent pharmacologic and technologic advances in anesthesia and surgery allow outpatients with complex medical problems to undergo a wide variety of diagnostic and surgical procedures on an ambulatory basis. Increasingly, however, anesthesia practitioners, as well as pharmacy and therapeutic committees, are demanding proof that a new, more costly drug or medical device is superior to existing products in achieving its desired effect, is associated with fewer adverse effects, enhances efficiency, and reduces health care costs. The new field of pharmacoeconomics has emphasized the importance of cost-effectiveness analyses that consider both direct and indirect costs of newer drugs and therapeutic modalities. As new biomedical technology is introduced to facilitate the perioperative management of patients (e.g., computerized anesthesia information management systems), evidence that these systems enhance our ability to continue to provide high-quality, cost-effective health care will assume increasing importance. Limitations in health care resources necessitate a careful reevaluation of our clinical practices with respect to choice of drugs, supplies, equipment, and even discharge criteria. Ambulatory anesthesia and surgery will continue to increase because of the potential cost savings for patients undergoing elective operations on an outpatient basis. However, the challenge we face will be to continue to provide high-quality anesthesia care at a reduced cost. A careful examination of commonly accepted (but unproven) clinical practice patterns will be necessary to meet this challenge.

Outpatient transurethral incision of the prostate under local anesthesia: operative results, patient security and cost effectiveness

J Hugosson, S Bergdahl, L Norlen and T Ortengren

Scand J Urol Nephrol 1993; **27**(3): 381–5

Thirty patients with small and medium-sized obstructive prostates were operated by transurethral incision of the prostate (TUIP) under local anesthesia as an outpatient procedure. All patients except one tolerated this manoeuvre without any complications or discomfort. The obstructive symptoms were relieved in all patients; however, 6 patients had lasting irritative symptoms, 2 of whom were cured after TURP. The costs of TUIP was calculated to be one sixth of that of TURP. During one year follow-up 5 patients were found to have prostate cancer despite careful rectal examination and PSA measurement preoperatively. In conclusion, TUIP may be carried out as safely and cost-effectively as an outpatient procedure and is beneficial in patients with predominantly obstructive symptoms. However, careful investigations concerning possible prostate cancer must be undertaken in this group of patients with small but symptomatic prostates.

Day case management in adjustable suture squint surgery

AJ Luff, RJ Morris and AC Wainwright

Eye 1993; **7**(5): 694–6

Day case adjustable suture squint surgery is limited by patient cooperation in the early post-operative period. Nausea is common and may be exacerbated by adjustment. To facilitate early adjustment, in 37 consecutive patients anaesthesia was induced with propofol and the airway maintained with a laryngeal mask. Before and after adjustment patients recorded their level of nausea on a visual analogue scale (1 = no nausea, 10 = vomiting). The mean age of the group was 31.9 years with 20 men and 17 women. Adjustment was performed at a mean time of 4.9 hours after surgery. On the analogue scale of nausea the mean score was 1.54 pre-adjustment and 1.73 post-adjustment. Only 1 patient was given a post-operative anti-emetic. All patients were sufficiently alert to adjust without difficulty and were discharged the same day. The use of a laryngeal mask and induction of anaesthesia with propofol in adjustable suture squint surgery facilitates early adjustment and thus day case management.

Preoperative intravenous diclofenac for postoperative pain prevention in outpatients

T Hyrkas, P Ylipaavalniemi, VJ Oikarinen and I Paakkari

Br J Oral Maxillofac Surg 1993; **31**(6): 351–4

Fifty patients undergoing a standard removal of an impacted lower third molar were given a single dose of 75 mg sodium diclofenac or saline (placebo) intravenously before operation, on a double-blind basis. Pain was measured postoperatively by means of a visual analogue scale hourly for the first 8 h and during the first and second days after operation. Administration of diclofenac resulted in greater pain relief than administration of placebo for the first 3 h after surgery, whereafter the treatments did not differ.

The results suggest that intravenous preoperative diclofenac may be useful in some clinical situations but generally it probably offers little benefit over the corresponding oral treatment.

Antiemetic efficacy of prophylactic ondansetron in laparoscopic surgery: randomized, double-blind comparison with metoclopramide

JH Raphael and AC Norton

BJA 1993; **71**(6): 845–8

In a randomized, double-blind study, we have compared the prophylactic antiemetic efficacy of ondansetron with that of metoclopramide in 123 patients undergoing general anaesthesia for day-case gynaecological laparoscopic surgery. The patients received either i.v. ondansetron 4 mg or metoclopramide 10 mg immediately before a standard anaesthetic.

The number of patients with no nausea or vomiting in the ondansetron group was 50 (82%) compared with 29 (47%) in the metoclopramide group ($P < 0.001$). In those patients with a previous history of postoperative nausea and vomiting, nausea was less severe in those receiving ondansetron compared with those receiving metoclopramide ($P < 0.05$). We conclude that preoperative prophylactic administration of i.v. ondansetron was superior to metoclopramide in preventing nausea and vomiting after general anaesthesia for day-case gynaecological laparoscopic surgery.

Nausea: the most important factor determining length of stay after ambulatory anaesthesia. A comparative study of isoflurane and/or propofol techniques

G Green and L Jonsson

Acta Anaesthesiol Scand 1993; **37**(8): 742–6

Speed of recovery and length of stay in hospital were studied in 95 ambulatory patients undergoing laparoscopy or arthroscopy. The patients were divided into three groups regarding maintenance of anaesthesia. Group A ($n = 32$) received isoflurane 0.7% end-tidally, group B ($n = 31$) propofol infusion for 25 min and thereafter isoflurane, and group C ($n = 32$) received an infusion of propofol throughout the procedure. Recovery was assessed by a combination of the Maddox-Wing, the Choice Reaction Time test and p-deletion. The awakening period was somewhat shorter in group A, but psychomotor recovery was somewhat slower compared to groups B and C. The length of stay in hospital depended on whether the patient was nauseated or not. In group A, 44% suffered from nausea requiring medical intervention compared to 13% and 19% in groups B and C, respectively.

The stay in hospital was 235 ± 90 min (mean \pm standard deviation) in group A compared to 184 ± 56 min and 197 ± 55 min in groups B and C, respectively. The non-nauseated patients in group A had a stay in hospital of 188 ± 55 min compared to 184 ± 52 and 184 ± 37 in the non-nauseated patients in groups B and C, respectively. In total, the nauseated patients ($n = 24$) stayed 267 ± 95 min compared to 185 ± 47 min for the non-nauseated patients ($n = 71$), $P < 0.001$. We found nausea to be the most important factor determining length of stay after ambulatory anaesthesia.

Pharmacokinetics and effects of i.m. alfentanil as premedication for day-case ophthalmic surgery in elderly patients

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We have studied the pharmacokinetics and effects of i.m. alfentanil as premedication for peribulbar block in 90 patients undergoing elective day-case cataract surgery. We compared alfentanil $12.5 \mu\text{g kg}^{-1}$ injected into the deltoid ($n = 30$) or gluteal muscle ($n = 30$) 15 min before the peribulbar block, and placebo ($n = 30$). The alfentanil concentrations were significantly

greater in the deltoid group during the study and the mean peak concentration occurred more rapidly in this group. Only alfentanil injected into the deltoid muscle reduced pain (assessed with a visual analogue scale (VAS)) associated with the peribulbar block. A mild sedative effect (VAS) was found in both alfentanil groups. We conclude that i.m. alfentanil appears to be a suitable premedicant for short, painful procedures because it has a short duration of action and is not associated with any clinically significant side effects.

Pain on injection of propofol: modification by nitroglycerin

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Anesth-Analg 1993; **77**(6): 1139–42

The effect of applying nitroglycerin or placebo ointment to the back of the hand before venipuncture and injection of propofol was investigated in 60 ASA physical status I unpremedicated women. Eighteen patients (67%) pretreated with nitroglycerin experienced no pain compared with 10 (33%) in the placebo group. Eleven in the placebo group experienced moderate or severe pain during injection compared with only one in the active group. The time of onset of pain in more than half the subjects occurred 10 s or longer after commencement of injection, and, in more than half the patients, the site at which pain was felt was above the injection site (with three subjects experiencing it in the shoulder). No patient had a headache or experienced postural hypotension. We conclude that nitroglycerin ointment applied to the back of the hand before injection reduces the incidence of painful injection with propofol.

Patient evaluation of four different combinations of intravenous anaesthetics for short outpatient procedures

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Anaesthesia 1993; **48**(11): 1005–7

We studied 200 female patients (ASA group 1) scheduled for termination of pregnancy under general anaesthesia. The patients were randomly allocated to receive one of four anaesthetic combinations;

- 1) propofol in combination with ketamine 20 mg,
- 2) propofol in combination with fentanyl 0.1 mg,
- 3) thiopentone in combination with fentanyl 0.1 mg,
- 4) methohexitone in combination with fentanyl 0.1 mg.

All patients were breathing oxygen in nitrous oxide 1:2. Patients' self assessments of pre- and postoperative course and time to discharge were compared. No patient's response suggested light anaesthesia, but dreams were frequently experienced during anaesthesia especially among the propofol-ketamine combination (29 out of 50). Time to discharge was shortest for the groups of patients given propofol; the mean time was 93 and 96 min for the ketamine and fentanyl groups respectively. During the recovery period significantly more

patients experienced pain in the ketamine-propofol group. Complaints of nausea were seen in only 15 patients, and seven patients noted psycho-mimetic side effects during recovery, without any differences between the groups.

All four combinations tested offered good conditions for short outpatient procedures. However, the propofol-fentanyl combination was found to offer the best quality of anaesthesia as assessed by the patients themselves.

Pain relief following day-case diagnostic hysteroscopy-laparoscopy for infertility: a double-blind randomized trial with preoperative naproxen versus placebo

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Obstet Gynecol 1993; **82**(6): 951-4

OBJECTIVE: To study the effects of preoperative naproxen on postoperative and post-discharge outcome and consumption of analgesics in patients undergoing diagnostic hysteroscopy and laparoscopy for infertility.

METHODS: A double-blind, placebo-controlled study was conducted in 60 healthy women scheduled for day-case hysteroscopy and laparoscopy. Subjects were randomized to receive either 500-mg naproxen suppositories (n = 30) or placebo (n = 30) preoperatively. Following discharge, each patient was given two naproxen suppositories for treatment of pain at home. Pain was scored on the Visual Analogue Scale, and the postoperative and post-discharge use of analgesics was determined, recorded, and analyzed.

RESULTS: Patients premedicated with naproxen had significantly less postoperative pain, showed more rapid ambulation, could be discharged earlier, and had less post-discharge pain. On the day after surgery, only six of 28 naproxen-treated patients needed analgesics, compared to 18 of 30 placebo patients. C

CONCLUSION: Day-case diagnostic hysteroscopy and laparoscopy for evaluation of infertility is potentially painful and stressful. Preoperative naproxen contributed to postoperative pain prevention, reduced hospital stay and consumption of analgesics, and shortened the period of post-discharge abdominal discomfort.

Analgesia after laparoscopic sterilisation. Effect of 2% lignocaine gel applied to Filshie clips

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Anaesthesia 1994; **49**(1): 68-70

The authors performed a randomised controlled study in patients undergoing day case laparoscopic sterilisation to assess whether coating Filshie clips with 2% lignocaine gel

prior to application to the Fallopian tubes would reduce postoperative pain. Sixty-two patients were studied, in 33 of whom the Filshie clips were coated in sterile 2% lignocaine gel.

Pain scores in the lignocaine gel group were significantly lower than in the control group at 1 h after return to the ward, but no differences were found immediately on return to the ward, or at discharge or at 24 h. There were no significant differences between the two groups in postoperative analgesic requirements or in side effects.

Transurethral needle ablation (TUNA): safety, feasibility, and tolerance of a new office procedure for treatment of benign prostatic hyperplasia

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Eur Urol 1993; **24**(3): 415-23

Many attempts have been made to develop a method for treating benign prostatic hyperplasia (BPH) that is minimally invasive, efficacious, and low cost. The transurethral needle ablation (TUNA) device has recently been developed to treat BPH by selectively ablating hyperplastic prostatic tissue.

A special catheter incorporates needles that deliver low-level radiofrequency power directly to a very localized area of the prostate. The needles have adjustable shields to protect the urethra if desired or necessary. It is positioned via transrectal ultrasound or direct vision.

A pilot study was performed in patients to evaluate TUNA feasibility via histopathological measurement of thermal lesion size and TUNA safety by:

- 1) monitoring urethral and rectal temperatures;
- 2) assessing the ability to localize lesions, and
- 3) determining patient tolerance of the procedure without anesthesia.

Twenty patients were treated using TUNA prior to scheduled retropubic prostatectomy. The surgical prostatic specimens were recovered from 1 day to 1 month after TUNA, were step-sectioned, and examined histologically. Patients were 68 years old on average with prostate weight varying from 14 to 88 g. The TUNA procedure averaged 27 min, 4 lesion treatments per prostate, and 4-15 W of power applied for 3 min. Proximal lesion temperature was about 40-50 °C with central lesion temperatures of about 80-100 °C. Urethral temperature averaged 37-42 °C and rectal temperature remained unchanged. Macroscopic examination of the specimens demonstrated localized lesions averaging 12 x 7 mm. Microscopic examination showed larger lesions of extensive coagulative necrosis averaging 30 x 15 mm. Specific immunohistochemical staining showed destruction of all tissue components.