Congress report

Panel on Ambulatory Surgery: Creative, efficacious and cost effective choices in ambulatory surgery
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Over 50% of surgery in the US is now performed on an outpatient basis and is predicted to increase to 70% over the next few years. The challenge that we face as anesthesiologists is to provide effective, quality, safe anesthetic care in an increasingly cost-conscious ambulatory surgery environment. Dr Roizen's presentation, 'Labora-

tory testing in the healthy adult: When are HCG, CXR, EKG, electrolytes or UA really necessary?' covered the theory and value of laboratory testing, evaluation of specific tests, and methods to ensure that a patient is asymptomatic and without risk factors for disease. Health care expenditures in the US have been rising rapidly since 1965 and if the same rate of growth continues, are expected to reach 100% of the gross national product by the year 2100. However, the amount spent on health care, including testing, does not equate with improved health of the population. According to a curve plotting wellbeing vs. health expenditures, once the

optimal point on the curve is exceeded, benefit declines and risk increases. Tests in asymptomatic individuals are not beneficial in screening for disease and may result in more harm than benefit. The value of each test must be considered in the context of its predictive value (sensitivity, specificity), disease prevalence and risk/benefit ratio. For example, if 13 blood tests were ordered in a group of healthy, asymptomatic individuals, the chance of one test being abnormal would be 64%. The chance of one being significantly abnormal would be slight, probably < 1%. Tests are more valuable for case finding in high risk groups: electrocardiogram (EKG) in males over 40, PAP smear every 1–3 years in females of childbearing age) or optimization of a known medical condition (glucose in diabetes). The key point in determining which tests to order is history.

Dr Roizen next discussed individual tests. For pregnancy, enquiry is the best tool. Human chorionic gonadotrophin (HCG) testing is only useful when the pregnancy status of a woman of childbearing age is uncertain. Chest X-ray is indicated for many categories of pulmonary/cardiovascular and other disease states. For example, in patients with arthritis, chest X-rays revealed a 68% incidence of abnormalities, of which 31% were significant; for patients post-heart-surgery over 50% of X-rays were significantly abnormal. Of 30 studies reported in the literature representing 26 000 asymptomatic patients under age 40, 31.9% had chest X-ray abnormalities of which 0.4% were significant. Of 9000 patients over age 74, 8.5% had significant abnormalities. According to risk/benefit analysis there would need to be at least 2.6% new and significant abnormalities for the screening benefit of the chest X-ray to outweigh its risk. This was found only in patients age 74 or over. Care was not changed nor outcome improved for asymptomatic patients who had chest X-rays. In a recent study by Warner in the *Journal of the American Medical Association* of long-term morbidity/mortality following ambulatory surgery in asymptomatic patients, preoperative chest X-ray did not prevent death by motor vehicle accident, myocardial infarction, pulmonary embolus, or stroke.

Indications for EKG are complex and include history of cardiac disease and many noncardiac conditions. For patients with angina, there is a 51.7% incidence of EKG abnormalities of which 27% are significant, while EKGs obtained in an asymptomatic population revealed a 5.6% incidence of abnormalities, with no significant abnormalities. Significant abnormalities increase with age. Based on risk/benefit analysis, routine EKGs are justified only in men over 40 and women over 50. Electrolytes are not recommended under the age of 40 except for specific indications. In patients receiving potassium supplementation there was an 8% incidence of significant electrolyte abnormalities compared to 1% in asymptomatic patients. Screening urinalysis detected less than 2% significant abnormalities and should never be done without indication.

Based on the above analysis, Dr Roizen has developed a series of recommendations for laboratory testing as

Table 1. Recommendations for laboratory testing

Age	Male	Female
6 months – 40 yr	None	Hct Pregnancy test (age 12–40)
40–50	EKG	Hct Pregnancy test (age 12–40)
50–64	EKG	Hct, EKG
60–74	Hct, EKG, BUN, glucose	Hct, EKG, BUN, glucose
> 74	Hct, EKG, BUN, glucose Chest X-ray	Hct, EKG, BUN, glucose Chest X-ray

shown in Table 1. At least $4 billion/year is spent in initial preoperative laboratory testing plus 10 times that in additional expenditures for follow-up of abnormalities. Dr Roizen's conclusion, based on statistical analysis, is that 60–70% of laboratory tests now being ordered are not indicated. The danger of no history is missing significant abnormalities. It is not useful to get tests for everyone and it may be dangerous not to get tests and not to do a history.

Dr Philip, in discussing 'Does choice of general anesthesia really make a difference?' considered cost-effective options for general anesthesia in the context of a prototype ambulatory surgery procedure: 33-year-old ASA 1 patient for laparoscopy. She defined the goals of general anesthesia for ambulatory surgery as a smooth onset, providing favorable intraoperative conditions, rapid immediate recovery, associated with minimum postoperative sequelae and prompt return to street fitness. Factors affecting the ultimate anesthetic cost in addition to drug acquisition cost are the extent of pharmacy mark-up (charge to patient), charge for extra preparation/control, billings to various hospital budgets, separate anesthesia charges (MD and supply), waste, cost of equipment required for drug administration, and surgeon/patient preferences.

Several studies have compared the effects of induction agents thiopental, methohexital, and propofol on recovery. Immediate recovery was slower with thiopental, while propofol showed an advantage for early awakening and recovery (ability to cooperate) compared to methohexital, but only for the first 15 min. There was, however, a greatly reduced incidence of nausea and vomiting with propofol compared to methohexital (43 vs 17%). The relative costs were calculated for each drug: thiopental ($0.51), methohexital ($1.54), and propofol ($6.34). Although there is a fourfold difference in cost between propofol and methohexital, the reduction of emesis by propofol may justify its increased cost.

Other studies compared recoveries with different maintenance techniques. Following a 1–2 h anesthetic, desflurane compared to isoflurane was associated with immediate recovery in half the time (eye opening, response to command) but conferred no advantage after 90

min or in ultimate recovery (home readiness). All patients in this study received heavy sedation plus thiopental for induction. In another study of isoflurane and sevoflurane recoveries following propofol induction and 1 h of anesthesia, although an early advantage was found with sevoflurane because of less nausea/vomiting and somnolence, there was no difference in time to first analgesic need or discharge. Comparing isoflurane vs. propofol by infusion following propofol induction, the initial wakeup and intermediate progression was faster with propofol with no difference in incidence of nausea and vomiting. In this study costs for isoflurane were $11, compared to $15 (plus $5 waste) for propofol. One study compared differential recovery times with estimated workload reduction in the postanesthesia care unit (PACU). Use of propofol compared to thiopental/isoflurane resulted in a 5.4–8.5 h workload reduction. To benefit from this potential savings would require an increase in PACU volume or a decrease in staffing. In another study patients who received propofol compared to thiopental/isoflurane for breast biopsy had less vomiting, improved ability to engage in light activity, and returned to work one half day sooner. The significance of this benefit is uncertain.

The relative costs of commonly used anesthetics were calculated by Dr Philip. Based on cost per liter of vapor, assuming 3 l diluent gas flow at 1 MAC for 1 h, costs were less than $1 for halothane, $12 for enflurane or isoflurane, and $6–17 for desflurane, depending on diluent gas flow (1–3 l). The cost of narcotics ranged from 7 cents per dose of fentanyl, $1 for sufentanyl, and $2 for alfentanil. For relaxants, considering the cost of intubation plus maintenance doses for 1 h, succinylcholine was only $2–3, vecuronium or mivacurium $14, and atracurium $18. The costs of pancuronium and curare for maintenance alone were $1–2. Dr Philip encourages us to question what value we are getting for what price. In order to properly assess the relative costs of general anesthesia for ambulatory surgery, specific recovery goals for early, intermediate, or late recovery must be defined. The benefits of a particular agent are specific to a procedure, its duration, an institution and its policies. Time savings do not translate into cost savings. Patient satisfaction may not be quantifiable. In conclusion, for analysis of cost effectiveness, determining the price is simple but determining the value is complicated.

Dr Mulroy considered 'Is regional anesthesia a viable choice?' for the same healthy ambulatory surgery patient undergoing laparoscopy. He practices at the Virginia Mason Clinic, where 60% of procedures involve outpatients of whom 60% receive regional anesthesia. The advantages of regional anesthesia are highlighted in the recovery process: decreased incidence of nausea and vomiting, readiness for rapid discharge, and persistence of analgesia during the postoperative period. It must be understood that pain and nausea/vomiting are complications in outpatients, generating cost for treatment and heading the list of unplanned admissions. In one British study of orthopedic patients who received narcotics,

40% vomited, of whom 23% were admitted. Although propofol has improved the quality of general anesthesia for the ambulatory patient by producing rapid recovery, the incidence of nausea/vomiting is still 15–25%.

At the Virginia Mason Clinic a prospective, randomized study was conducted this year comparing propofol general anesthesia vs. axillary block for hand surgery. The cost of drugs and equipment were comparable for either technique. The major difference was in discharge times. The discharge time for axillary block was 1 h compared to more than 2 h for propofol, representing recovery room cost savings. The anesthesia time was 16 min longer for the axillary block, which was performed in the induction room and did not delay surgery. Interestingly Dr Mulroy believes that recovery room time could have even been 30 min less for the regional group if discharge was aggressively promoted. These times and cost savings are important, especially when little sedative is administered and patients can be advanced directly to phase two recovery.

In an earlier study at the same institution comparing enflurane general anesthesia, fentanyl/N$_2$O general anesthesia, and chloroprocaine epidural for laparoscopy, the recovery times were 2 h for the regional, 2½ h for the inhalational, and 3 h for the narcotic technique. The incidences of nausea and vomiting were 10%, 25%, and 40% respectively. The differences in recovery stay were attributable to differences in the incidence of nausea and vomiting. Based on this study, narcotics are no longer used at Dr Mulroy's institution for general anesthesia for laparoscopy. Some might question whether epidural anesthesia is a reasonable choice for laparoscopy. Dr Mulroy responds that epidural anesthesia is not suitable for lengthy laparoscopies for infertility associated with a high anxiety state. Epidural is recommended for selected laparoscopies expected to be of short duration, with minimum distension, and for a cooperative patient. He asserts that in the right situation, epidural anesthesia is a very pleasant experience for laparoscopy.

Dr Kapur's presentation, 'Innovative options for postoperative pain control: RA, PCA, combined techniques, local infiltration, NSAIDS, intra-articular narcotic' concentrated on the decision-making process involving postoperative pain control. She noted that factors dictating choices for postoperative pain control are related to the specific modality itself, the type of surgery and the patient. Narcotics, the primary option, are the mainstay of postoperative pain management. Negative associations about narcotics stem from experience with prolonged recovery room stays and various side effects: sedation/somnolence, nausea/vomiting, constipation and pruritis. If systemic narcotics are selected for pain control, efforts should be made to use generic forms to lower cost and anesthesia techniques such as inclusion of propofol, administration of prophylactic antiemetic, and careful titration to diminish side effects. Dr Kapur outlines three phases of narcotic administration therapy for the recovery room: use of short onset drugs (fentanyl) intravenously, followed by moderate duration drugs

(hydromorphone) intravenously, and accompanied by moderate duration drugs orally. Narcotics must be aggresively titrated to maintain momentum, which should be continued with a prescription ready at discharge.

Nonsteroidal drugs, especially Ketorolac have received mixed reviews as to their narcotic sparing effect. They may be given orally or parenterally, alone or in combination with other agents. Early administration is important since time is required for effect. The only major reported risk is bleeding. Advantages of local infiltration are low cost of generic preparations and ability to decrease requirements for systemic narcotics by depression of neural feedback loops. While local anesthetics are particularly effective prior to surgical incision, new data indicates that they are also effective postprocedure. Intra-articular narcotics such as Duramorph have also proven to be very effective in postoperative pain control and may be used with or without local anesthetic. Systemic absorption does occur. Time should be allowed for onset of effect prior to joint irrigation.

Regional anesthesia (RA) is an ideal primary technique for extremity surgery, decreasing the need for analgesics intra- or postoperatively. This technique may be combined with sedative/hypnotics and also has pediatric applications. 'Kiddie caudal' is especially useful for urologic procedures. Patients who have not fully recovered from regional anesthesia at discharge should be given specific instructions for protection of the extremity. Patient-controlled analgesia (PCA) is best administered in a 23-h observation unit or at home for procedures requiring more intensive postoperative pain management such as laparoscopic cholecystectomy or anterior cruciate ligament repair. While resulting in greater patient satisfaction with less intensive nursing care, side effects are encountered and costs for equipment and drug preparation may be considerable. Whatever the choice, Dr Kapur recommends addressing the plan for postoperative pain control prospectively with the patient. The recovery room staff is encouraged to 'buy in' when clearcut protocols are established and commitment is made to early pain treatment.

Dr Apfelbaum explored the provocative, complex, and controversial question of 'Post-operative care management: Is phase I recovery always necessary? What are appropriate discharge criteria in the 90s?' In an era of cost consciousness and outpatient cases of increasing complexity, he urges development of creative strategies for management of the recovery process. PACU care is in fact 'intensive care', and the luxury and expense of prolonged recovery room care is extinct. It must be recognized that ambulatory patients have very different needs from inpatients and place special demands on our anesthetic management for a rapid, yet safe recovery. With introduction of newer anesthetic agents, some patients already meet discharge criteria on arrival to the PACU.

Our decisions about the postoperative management of patients are influenced by measurements of recovery by existing scoring systems, Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and American Society of Anesthesiologists (ASA) standards, and practical discharge criteria. Stewart in 1977 defined three stages of recovery from anesthesia. Phase 1 or immediate recovery, measured by most recovery scores includes stable vital signs, return of consciousness, presence of airway reflexes, ability to follow commands, and gross motor activity. Phase 2 or intermediate recovery includes home readiness, coordination, absence of dizziness, drowsiness, minimal pain, minimal nausea/vomiting. Phase 3 is long-term recovery, encompassing hours or days, and determined by sophisticated psychomotor testing. Current recovery room scoring systems measure only immediate recovery, appropriate in determining readiness of inpatients to return to the floor, and lack validation data related to what is safe. We need to concentrate on intermediate recovery.

According to the Surgery and Anesthesia section of its manual, the JCAHO requires postoperative status to be evaluated upon admission to and discharge from the recovery room. Documentation is required of vital signs, level of consciousness, fluids, drugs, and blood administered, unusual events or postoperative complications and management. The responsibility for discharge is assigned to a licensed independent practitioner with appropriate privileges. If the practitioner is not present or does not sign the discharge order, relevant discharge criteria must be established and rigorously applied. Following general, regional, or monitored anesthesia care, the ASA specifies that appropriate postanesthesia care, such as PACU or equivalent should be available, and that all patients should be admitted to a PACU except by specific order of the anesthesiologist responsible for their care, allowing for latitude based on medical judgement.

Practical discharge criteria for phase 1 recovery include baseline Aldrete score, stable vital signs, baseline orientation, ability to sit, stand and ambulate. Patients should be assessed while still in the operating room (OR) to determine if there is a need for phase 1 recovery. Now with titration of newer agents, about 15% of patients receiving general anesthesia may progress directly to phase 2 if they meet criteria. Criteria for phase 2 recovery include presence of responsible escort, plus or minus the ability to take oral fluids or void, and no excessive pain or nausea/vomiting. Ambulatory surgery challenges us to provide anesthesia for the shortest time at the lowest anesthetic concentration; then to recover the patient with the goal of a safe and timely discharge. Medical decisionmaking is critical and must be based on aggressive pursuit of the patients' needs. Flexibility and practicality in managing recovery and discharge should be the key, but these should not be achieved at the expense of safety.

Dr Levy welcomed the audience to the wonderful new world of aftercare in her presentation, 'Reasonable options after discharge from the PACU: What's better than chicken soup?' It is in aftercare that there is blurring of the distinction between inpatient and outpatient surgery. By 1995 it is predicted that 90% of cholecystecto-

mies, 80% of nephrectomies, 70% of herniorraphies, appendectomies and hysterectomies will be done on an outpatient basis. Therefore, more innovative and intensive postoperative management will be required. Ability to perform major surgery with a minor operation fuels aftercare. Dr Levy stated that aftercare forces reflect first, efforts at cost containment, competition of hospitals for market share, convenience to their patients, and desire for efficiency; and second, technological advances, including endoscopic surgery, designer pharmaceuticals and the availability of infusion devices. Options for aftercare include the 23-h recovery facility, free-standing recovery centers, home healthcare and hospital hotels. The successes and difficulties of each were discussed by Dr Levy.

The advantages of a 23-h observation facility are: competitive pricing at a level less than an inpatient and more than an outpatient; convenience for unexpected admissions due to pain, nausea/vomiting etc.; and the ability to use existing inpatient hospital facilities without the need for admission, certificate of need, or capital outlay. However, in hospitals with high occupancy such an arrangement may waste inpatient beds. Placing outpatients in an inpatient setting increases the level of care with greater overheads and problems exist with reimbursement, although many insurance carriers will reimburse for up to 72 h of care. Another option, the hospital hotel offers low overheads (without nurses or ancillary personnel), improved ambience and comfort for patients, and immediate access to the hospital. At the University of Michigan the cost for the hospital hotel is $51 a night. No medical care is given. For reimbursement, approval is required by a case manager and patient eligibility is limited to the elderly or patients living at a distance from the hospital.

The concept of postsurgical recovery centers was developed as a demonstration project in California between 1986 and 1989. The idea originated in response to a perceived need to decrease aftercare costs. The state authorized the creation of centers over a three-year period (which was later extended), specifying requirements for size, length of stay, availability of skilled nursing care and proximity to the hospital. The admissions were to be planned and medical criteria established. Dr Levy presented actual data for one quarter of 1992–93: 602 discharges; average stay of 39 h; length of stay >2 days for 25% of patients; hospital transfer rate 0.4%. Cases recovered in these facilities included laparoscopic cholecystectomy, cruciate ligament repair, hysterectomy, shoulder repair, mammoplasty. Average fee for surgery was $5000. Average recovery charge was $912. Payment sources were health maintenance organization (HMO), private insurance, Blue Cross/Blue Shield, but not Medicaid/Medicare, which refused to reimburse because "licensing was not required, quality issues were not addressed and cost savings were not proven." Presently only three centers remain and the project is judged a qualified failure. Dropout was attributable to problems with reimbursement, especially Medicare.

Figures show that expenditure for home healthcare services was $4.7 billion in 1987 increasing to $16.5 billion in 1993. Costs at the University of Michigan Medical Center are considerable, averaging $70/80 per visit (15 min to 2 h). Most of these charges are reimbursed by insurance, although there is limited eligibility. Drugs and durable goods are billed separately. A study funded by the National Institute of Health (NIH) was conducted at the University of Pennsylvania of 200 women post-hysterectomy randomized to early vs. later discharge to home. Those who were discharged early received home healthcare services and follow-up by a nurse. For those who were discharged early, there was only half a day decrease in length of hospital stay and no cost difference, but increased patient satisfaction and knowledge. Problems encountered were limited eligibility/reimbursement and nonreimbursement for required physician oversight of nursing care. The Congressional Budget Office concluded that this mode of care could result in increased Medicare spending.

Dr Levy cautioned that in our current environment as costs become the paramount issue, we must be aware that one alternative to aftercare is no care. In a study of outpatient laparoscopic cholecystectomies currently being conducted by Chung in Canada, 10 out of 43 patients were admitted for surgical and personal reasons, rarely related to anesthesia. Fear is that pressure will now be exerted to send everyone home. Chung's outcome data indicate that no aftercare may be safe and appropriate in terms of major complications, but what about subtler changes affecting ultimate recovery? Dr Levy advises that outcome studies are needed to assess different anesthetic techniques, pain management regimens and modes of aftercare to determine which are most beneficial to outpatients.

In 'Choices for the healthy pediatric outpatient: Laboratory testing, intraoperative techniques, postoperative pain control, discharge criteria' Dr Lichtor addressed several issues relevant to pediatric ambulatory anesthesia. Routine laboratory testing is not the norm in children. In a study of 1800 patients by Baron in 1992, there was a 1% incidence of abnormal hematocrit (<30 or >50), and in no case was surgery cancelled. History and physical examination were the best predictors of anemia, of which there is low prevalence. In an earlier inpatient study by O'Connor, there was a 12% incidence of anemia in children but 74% of children found with anemia were not followed up. For children with a history of prematurity, there was an increased incidence of apnea for those with decreased hematocrit. Therefore, according to Dr Lichtor, for healthy children, hematocrit is not necessary. For unhealthy children, those with sickle cell disease, upper respiratory infection, fever, failure to thrive or prematurity, hematocrit should be performed.

Should an ex-premature infant go home after spinal anesthesia? The technique of spinal anesthesia in children was reviewed. Wellborn in 1990 conducted a study of spinal vs. general anesthesia for inguinal herniorraphy in children and found that postoperative apnea was

nonexistent for those who received spinal alone. For those who received spinal plus sedation (ketamine) or general anesthesia, postoperative apnea occurred. One study reported that all patients who experienced postoperative apnea had general anesthesia. In another study of 133 expremies, only one experienced postoperative apnea, after receiving supplemental postoperative midazolam. Therefore, although controversial, Dr Lichtor believes it is safe for healthy expremies without other medical problems and who have not received other medications to go home following spinal anesthesia.

Is the time to discharge quicker with the newer anesthetic agents propofol and desflurane? Most benefit with propofol is seen after longer operations (> 1h). In comparing propofol and thiopental for strabismus surgery, there was a clinically significant increase in oculocardiac reflex with propofol. Vomiting was less with propofol than halothane, and there was decreased incidence of airway obstruction. To avoid pain after injection, the patient should be induced with halothane and the i.v. placed after the patient is asleep; anesthesia is maintained with propofol. Desflurane inhalation induction is associated with problems such as coughing and laryngospasm. This agent should not be used in children except for maintenance. No pediatric data are available regarding time to discharge with desflurane.

To determine postoperative oral fluid requirements, a study was done in which children were divided into two groups, mandatory vs. elective drinkers. Both groups actually drank the same amount. The time to discharge was shorter for the elective drinkers, who experienced less vomiting. Kiddie caudal with or without epinephrine compared to ilioinguinal nerve block did not affect pain score or time to void and did not affect recovery room stay if the patient was healthy and well hydrated. Therefore, Dr Lichtor concludes that children do not need to drink prior to discharge, and that kiddie caudal does not prolong recovery room stay.

ONE DAY SURGERY

Milan, 29-30th June - 1st July

The 1994 One-Day Surgery meeting will be held at: The Department of General and Oncological Surgery, Aula Padiglione Monteggia, Ospedale Maggiore, Policlinico, Via F. Sforza, 15, 20122 - Milano, Spain.

Conference topics:

- Organization
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