

Review

To be an outpatient, or not to be — selecting the right patients for ambulatory surgery

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Selecting the right patients for ambulatory surgery is an integral part of ensuring that quality of medical care is delivered in this setting. Outpatient surgery's exponential growth of the 1980s has spilled over into the last decade of this century, projecting that by the year 1995 over 60% of all elective surgery will be performed on an outpatient basis. Accordingly, we have witnessed the change in composition of ambulatory surgery patients. This article discusses the adaptation that physicians have made to meet the demands of the changing face of ambulatory surgery. Modes of preoperative screening and patient selection will be reviewed.

Key words: Ambulatory surgery, preoperative screening, patient selection

The growth of ambulatory surgery in the past decade has drastically changed the approach to the surgical patient. Admitting a patient for an elective surgical procedure a day or two before, and recovering him in the hospital appears to be a practice of the past, perhaps something to be found in the archives of surgery and anaesthesia. In fact over 50% of elective surgery in North America is currently performed on an outpatient basis with a projected increase to 60% by 1995.

While the concept of performing surgery in a short-stay facility or outside a hospital can find its historical origins as early as the turn of the 20th century^{1,2}, over 60 years had passed until outpatient surgical programmes had begun to integrate themselves into the scope of acceptable surgical and anaesthesia practice. In the early 1960s, outpatient surgical programmes were initiated at the University of California at Los Angeles and George Washington University in Washington, DC. In 1970 the first freestanding surgicentre facility was opened in Phoenix, Arizona by Drs Reed and Ford, two anaesthesiologists. In 1980, outpatient surgery accounted for a small fraction (16%) of total surgeries performed. Then, an explosive growth occurred. Figure 1 shows that hospital-based outpatient surgeries more than tripled during the 1980s from 3 million to 11 million in 1990. At the same time, inpatient surgeries dropped by over 31%. As a

result, the annual number of outpatient surgeries exceeds the number of inpatient surgeries. A significant development in the last half of the 1980s was the growth of off-campus freestanding ambulatory surgery centres (FASCs). Hospital-owned ambulatory surgery centres (ASCs) physically separated from the hospital are also considered 'freestanding'. Because FASCs are physically separate from the hospital's emergency department and other back-up services, FASCs were limited in the types of surgeries that could be performed. Significant growth occurred in FASCs over the past 10 years due to the increase in Medicare-approved procedures for FASCs. While these procedures are a lower acuity than those performed in hospital outpatient surgical departments, the complexity of procedures that can be performed in FASCs is increasing. Of the 11 million ambulatory surgeries performed in 1990, approximately 3 million were performed in free-standing ambulatory surgery centres. A marketing survey projected that although there are currently over 1600 FASCs, by the end of 1993 there will be approximately 1708 freestanding surgery centre facilities in the United States, averaging over 2000 procedures per facility, thereby accounting for approximately 3.8 million outpatient procedures^{3,4}. As a result, hospitals' share of the total number of outpatient surgeries declined, from more than 90% in 1985 to 83% in 1990 (Figure 2).

This development, fuelled by new technology, rapid- and short-acting new anaesthetics as well as changes in inpatient reimbursement, is one of the most dramatic changes in surgical care. Many of the most frequently performed surgical procedures have been or soon will be affected by new techniques that reduce the length of stay,

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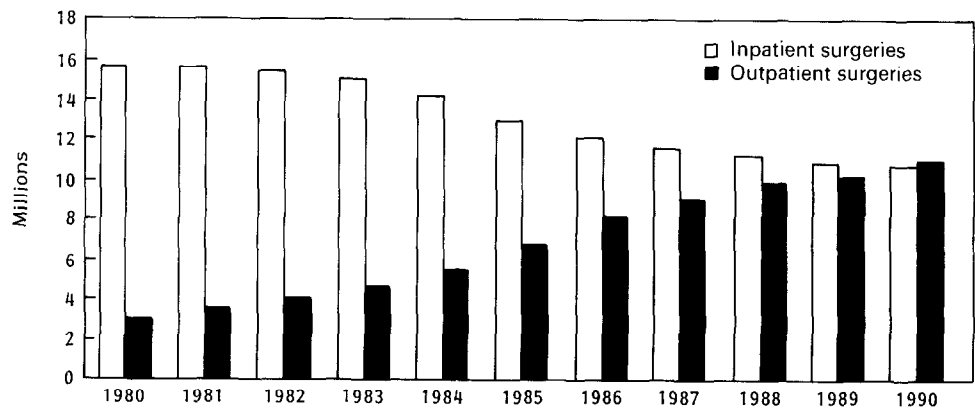


Figure 1. Hospital outpatient surgeries as per cent of total, by bed size, 1985 and 1990. Source: American Hospital Association Survey 1980–90.

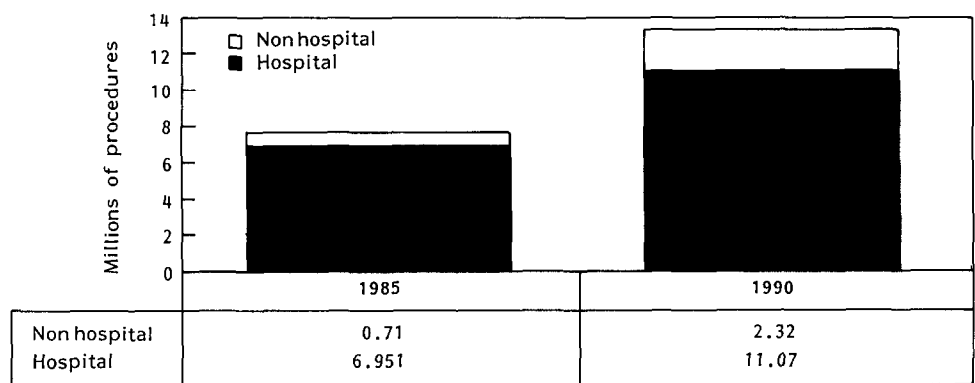


Figure 2. Comparison of surgeries performed by hospital vs nonhospital facilities. Source: American Hospital Association Survey 1980–90.

or allow the surgery to be performed in the outpatient setting. For example, gallbladder surgery and hysterectomies, surgeries that are among the 10 most frequently performed surgical procedures in the US are changing rapidly due to the use of laser and endoscopy. New techniques that are performed via endoscopy through small incisions or natural orifices are dramatically changing how surgery is performed, and particularly the length of recovery time needed after surgery. Some industry experts predict that 80% of abdominal surgery will be performed by endoscopy surgery by the year 2000⁵. With the development of newer shorter-acting anaesthetics and innovations in pain management, patients wake up quickly after surgery and have a smooth and swift recovery. It appears that the primary growth of ambulatory surgery in the future will be the conversion of inpatient procedures to outpatient as a result of new anaesthetic drugs and changes in technology.

Preoperative screening

The response by physicians to this exponential growth has been to take a proactive role in adequately screening and preparing surgical outpatients. As the complexity of procedures and patients increases, assessing patients prior to surgery has become integral to the quality of

health care delivered in this setting. Preoperative screening can serve the following purposes: relieve patient anxiety; identify at risk patients; identify inappropriate patients, socioeconomic, administrative problems and initiate patient education. In addition, preoperative screening can improve operating room efficiency by reducing unnecessary cancellations and unanticipated hospital admissions. The interdisciplinary communication among anaesthesiologists, surgeons, primary care physicians and nurses is crucial in achieving these goals. Busy day-surgery units cannot rely on the surgeon alone to present them consistently with fully evaluated and prepared patients. This is especially true when a large number of surgeons with varying interests and attitudes have privileges to practice in many units. In order to expedite the evaluation process and ensure some degree of uniformity in the preoperative preparation, personnel other than surgeons in some facilities have found it useful to participate in the preoperative screening process. Therefore many modalities have been developed for preoperative screening: health questionnaires; telephone screening; facility visit before surgery, or combination of these.

A health questionnaire that systematically covers a review of systems, anaesthesia and surgical history, medication use, drug history, supplemented with a physi-

cal exam is an acceptable screening tool and should lead the clinician to select appropriate laboratory studies (Table 1). The accuracy of the questionnaire depends on the patient's comprehension and reliability and may not eliminate completely the need for a personal interview and physical examination. The disadvantage of this system is that if the questionnaire is completed in the physician's office, there must be a mechanism for timely review of the laboratory studies and medical information. These findings need to be communicated to the anaesthesiologist as well.

In the paediatric population, a telephone call conducted in advance of surgery has been reported to be an effective screening tool, reducing the rate of postponement or cancellation by approximately 50%. Patel and Hanallah⁶ found that a comprehensive preoperative telephone interview including specific questions about prematurity, cardiac, pulmonary, renal, endocrine, and other anaesthesia-related risks is an effective method to identify anaesthetic risk factors that may require further preoperative evaluation. Calling parents during evening hours and encouraging them to call the centre during off-hours via an answer machine increased preop contact, thereby improving the prescreening process. Since the need for laboratory testing is minimal in the paediatric population, many institutions have adopted this approach and perform laboratory tests the morning of the procedure. Presurgical clinics/facility visits have achieved popularity because they coordinate a 'one-stop shopping' for the patient. Patients can undergo laboratory testing, consult with the anaesthesiologist, meet with nursing staff to initiate patient education, discuss pain management and reinforce preoperative and postoperative instructions in an unhurried manner. If the patient has not undergone a history and physical in the surgeon's office, depending on the facility, the patient may also undergo a physical examination at that visit. A facility or clinic visit can be combined with a health questionnaire which then allows the physician's time to be more directed to each patient. HealthQuiz, an alternative to the conventional health questionnaire, has been evaluated in this setting. HealthQuiz, designed by Roizen and colleagues at the University of Chicago, is a handheld laptop computerized questionnaire. The patient goes through a series of over 100 questions which can be answered with a simple "yes", "no", or "not sure" and takes approximately 10 minutes to complete. A summary of the patient's history is generated along with recommended laboratory tests based on the history. Lutner et al. have found the responses to be comparable to that of a personal interview and effective in reducing unnecessary laboratory tests, as well as maximizing the time spent with the examining physician or physician extender⁷. While a preoperative visit by an anaesthesiologist has traditionally been suggested to relieve patient anxiety in inpatients, the effectiveness of such a visit in reducing anxiety has been recently questioned⁸⁻¹⁰. Twersky et al. noted that ASA physical status 1 and 2 patients that were seen 1-7 days preoperatively had no further reduction in their anxiety scores compared to those patients that were

seen for the first time on the day of surgery⁸. The role of the anaesthesiologist in prescreening ambulatory patients is undoubtedly important in assessing patient risk factors, anaesthesia plan, and need for further medical optimization. While the need for further consultation may be initiated by the surgeon, the anaesthesiologist often assumes the role of the primary care physician in evaluating patients and identifying particular medical issues that need to be addressed, prior to elective outpatient surgery. Each institution must decide for themselves what works best in their facility. Some form of preoperative screening prior to the day of surgery should be adopted in almost any active ambulatory surgery unit so that the necessary medical, administrative and financial information be obtained prior to the day of surgery, and appropriate steps for resolution of problems be taken. Because of variability among surgeons in medically evaluating patients, to ensure some degree of uniformity, the anaesthesiologist must participate in preoperative screening and evaluation.

Patient selection

Appropriate patient selection implies that, first, the patient agrees to the concept of short-stay admission and will be able to follow both preoperative and postoperative instructions, including specific information regarding nothing per os (NPO) status, medications, escort and postoperative care, or at least designate a responsible person for participating in the postoperative care. No longer is ambulatory surgery limited to ASA physical status 1 or 2 patients undergoing superficial or minor procedures. Table 2 lists the American Society of Anesthesiologists Classification (ASA Physical Status Classification) commonly used by anaesthesiologists to categorize patients based on medical status and risk. More recently, many adult patients with angina, hypertension, congestive heart failure, diabetes mellitus, asthma, chronic obstructive pulmonary disease, morbid obesity, as well as paediatric patients with sickle cell disease, former pre-term infants, respiratory infections, susceptible malignant hyperthermia may be scheduled for outpatient surgery. Many of these patients may be inappropriate for the outpatient setting. These problems can be uncovered during the presurgical testing and screening process. The patient should be in reasonably good health or at least in stable and optimized medical status. The appropriateness of ambulatory surgery for many of the problem patients we encounter during prescreening is determined by the projected postoperative needs and requirements of these patients during recovery from anaesthesia and surgery.

Occasionally, certain factors exist that prohibit cases from being performed on an ambulatory basis. Special individual consideration for reimbursable hospitalization is given under the following conditions: patients with coexisting medical conditions, that make prolonged postoperative observation by a nurse or skilled medical personnel a necessity; patients who lack proper home postoperative care; patients in whom there is a possibility

1. PLEASE FILL IN THE FOLLOWING FORM, ANSWERING THE QUESTIONS TO THE BEST OF YOUR ABILITY.
2. IF YOU HAVE ANY QUESTIONS, OR DO NOT UNDERSTAND SOME OF THE ITEMS, WE WILL CLARIFY THEM AT THE TIME OF YOUR INTERVIEW.
3. ANY REMARKS CAN BE WRITTEN IN THE SPACE PROVIDED AFTER THE ITEM LISTED.
4. Anything marked "YES" should be further explained, including the dates involved, in the space provided under "Patient's Comments."

GENERAL INFORMATION				
NAME	AGE	HOME	TELEPHONE NUMBER	WORK
ADULT RESPONSIBLE FOR TAKING YOU HOME	RELATIONSHIP	HOME	TELEPHONE NUMBER	WORK
MEDICAL DOCTOR/INTERNSIST		TELEPHONE NUMBER		

TO BE CHECKED ON ADMISSION							
HEIGHT	WEIGHT	TEMP.	PULSE	RESP.	B.P.	NPO	SINCE

AM/PM

MEDICAL QUESTIONNAIRE									
PLACE "X" IN PROPER COLUMN		YES	NO	DON'T KNOW	PLACE "X" IN PROPER COLUMN		YES	NO	DON'T KNOW
1 DO YOU HAVE ANY ALLERGIES?					13 HAVE YOU EVER HAD ANY DIGESTIVE TRACT PROBLEMS?				
2 DO YOU TAKE THE FOLLOWING MEDICATIONS ROUTINELY AT HOME?					14 HAVE YOU EVER HAD ANY MUSCULO-SKELETAL PROBLEMS?				
1 BLOOD PRESSURE PILLS					15 HAVE YOU EVER HAD ANY NEUROLOGICAL PROBLEMS?				
2 WATER PILLS					16 HAVE YOU EVER HAD ANY METABOLIC PROBLEMS?				
3 OTHER MEDICATIONS					17 HAVE YOU EVER HAD ANY HEMATOLOGICAL PROBLEMS?				
3 DO YOU TAKE ANY MEDICATIONS, INCLUDING NON-PRESCRIPTIONS OCCASIONALLY AT HOME?					18 HAVE YOU EVER BEEN TREATED FOR MENTAL PROBLEMS?				
4 DO YOU HAVE TO TAKE ANTIBIOTICS TO PROTECT YOUR HEART BEFORE SURGERY?					19 HAVE YOU EVER HAD/OR HAVE BEEN VACCINATED AGAINST THE FOLLOWING COMMUNICABLE DISEASES?				
5 DO YOU SMOKE?					20 IN THE LAST 4 WEEKS HAVE YOU HAD?				
6 DO YOU DRINK ALCOHOLIC BEVERAGES?					21 HAVE YOU BEEN EXPOSED TO THE BODY SECRETIONS OF ANYONE LIKELY TO HAVE THE AIDS VIRUS?				
7 DO YOU TAKE ANY STREET DRUGS?					22 FOR PEDIATRIC PATIENTS ONLY				
8 DO YOU HAVE ANY LOOSE, CHIPPED, CRACKED OR FALSE TEETH?					BORN PREMATURE				
9 DO YOU WEAR CONTACT LENSES?					BREATH-HOLDING				
10 HAVE YOU EVER HAD ANY HEART PROBLEMS?					SPELLS				
HIGH BLOOD PRESSURE					HISTORY OF				
LOW BLOOD PRESSURE									
RHEUMATIC FEVER									
HEART ATTACK									
HEART MURMUR									
CHEST PAINS									
CHEST TIGHTNESS									
IRREGULAR HEARTBEAT									
SHORTNESS OF BREATH									
OTHER									
11 HAVE YOU EVER HAD ANY LUNG PROBLEMS?									
ASTHMA									
BRONCHITIS/PNEUMONIA									
SHORTNESS OF BREATH									
RECENT COUGH OR SPUTUM									
TUBERCULOSIS									
OTHER									
12 HAVE YOU EVER HAD ANY URINARY PROBLEMS?									
URINARY INFECTIONS									
KIDNEY STONES									
OTHER									

NOTE: PATIENT HISTORY CONTINUED ON BACK

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**NOTE: PATIENT HISTORY
CONTINUED ON BACK**

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OVER

Table 1. contd.

23. HAVE YOU EVER HAD AN ANESTHETIC?					YES	NO	DONT KNOW
YEAR	OPERATION	TYPE OF ANESTHESIA			LOCAL-NUMBING SITE OF SURGERY		
		LOCAL	REGIONAL	GENERAL			
					REGIONAL-NERVE BLOCK		
					GENERAL-WENT TO SLEEP		
24. HAVE YOU EVER HAD A PROBLEM WITH AN ANESTHETIC?							
25. HAS ANY BLOOD MEMBER OF YOUR FAMILY HAD PROBLEMS WITH AN ANESTHETIC?							
26. WHAT WAS THE DATE OF YOUR LAST MENSTRUAL PERIOD (FOR OB/GYN PATIENTS ONLY)					▶		

ITEM NUMBER	PATIENT'S COMMENTS	
		PATIENT'S SIGNATURE
		DATE
		INTERPRETER'S SIGNATURE
		DATE
ITEM NUMBER	PHYSICIAN'S COMMENTS	
		PHYSICIAN'S SIGNATURE
		DATE
REVIEWED BY		DATE
RN		

Table 2. The American Society of Anesthesiologists' physical status classification

<i>Classification</i>	<i>Description</i>
Class 1	A healthy patient Example: Inguinal herniorrhaphy in otherwise healthy patient
Class 2	A patient with mild systemic disease Example: Diet-controlled diabetes; mild hypertension
Class 3	A patient with severe systemic disease that is not incapacitating Example: Coronary artery disease with angina; insulin-dependent diabetes; moderate to severe pulmonary insufficiency
Class 4	A patient with incapacitating disease that is a constant threat to life Example: marked cardiac insufficiency; advanced pulmonary, renal, or endocrine insufficiency
Class 5	A moribund patient not expected to survive for 24 hours with or without operation
Emergency (E)	The suffix E is used to denote the presumed poorer physical status of any patient in one of these categories who is operated on as an emergency (inappropriate for outpatient surgery)

that more surgery could follow the initial procedure; and technical difficulties, as documented by admission or operative notes. It is important to identify these special situations prior to surgery so that the necessary arrangements can be made. Common problems in patient selection will now be discussed including physical status, age, diabetes mellitus, child with upper respiratory tract infection (URI), malignant hyperthermia.

Physical status

The selection criteria have become increasingly liberal, in fact many patients in physical status 3 and rarely 4 are referred for ambulatory surgery, because of the nature of their procedure (e.g. carpal tunnel, extremity procedure, cataract extraction). The price paid for relaxing selection criteria may be an increased rate of unplanned hospital admissions, or in the case of freestanding surgery centres, increased transfers from a rate of 0.02–0.6% for ASA physical status 1 and 2 patients to a rate of 0.5–1.5% when some ASA physical status 3 are selected¹¹. Even with the inclusion of sicker patients, the hospital admission rate should be below 2%. Natof, in a prospective study, found the incidence of perioperative complications in patients with preexisting disease (1.16%) comparable to patients with no preexisting disease (1.12%)¹². He also reported that ASA physical status 3 and 4 may be considered candidates for ambulatory surgery if their systemic diseases are well controlled preoperatively. These circumstances require a dialogue among the treating primary care physician, specialist, surgeon and

anaesthesiologist. In a retrospective review of over 87 000 cases performed in FASCs, an increased risk of perioperative complications occurred in patients who had preexisting cardiovascular diseases. The risk was reduced when symptoms were under good control for at least 3 months prior to the operation¹³. Physical status 3 and 4 are appropriate candidates for ambulatory surgery only when their health problems are well controlled, plans have been made for the postoperative monitoring and treatment of those problems and, of course, their home situation can accommodate their postoperative needs. When screening, the physician must evaluate how stable the patient's condition is. Would preoperative and/or postoperative hospitalization provide any benefit? What can be reasonably done to improve the patient's health status thereby decreasing the patient's risk of suffering a complication or decompensation? Some ambulatory units may not feel comfortable managing medically complicated cases and therefore, hospital units (integrated, separated) are more likely to accept these admissions because of the relative ease with which inpatient admission can be arranged.

Age

Age alone is not an exclusion criterion for ambulatory surgery. The important factors that play a role in determining the suitability for outpatient surgery are both the physiological age and functional state of the patient.

The very young

Although there are no definite studies that have determined the safe period to perform ambulatory surgery on full-term infants, many centres will perform ambulatory surgery requiring general anaesthesia after 2–4 weeks of birth; more conservative centres will wait 3–6 months. Healthy term infants fare well through the outpatient setting and allow the families to become actively involved in their perioperative care. The ability to resume normal feedings and basic needs can be best met at home with a nurturing family. Although there are some parents that feel reluctant to assume this responsibility, most families accept this willingly. The concern has primarily focused on anaesthetizing the premature and ex-premature infant for ambulatory surgery. These infants are at greater risk of developing life-threatening apnoea, hypothermia, irregular breathing, aspiration of liquids, and laryngeal spasm in the perioperative period. The appropriate age at which their respiratory and central nervous system has reached a mature state, reducing the likelihood of apnoeic spells, bradycardia and other cardiorespiratory difficulties varies in the literature from 44–60 weeks postconceptual age (postconceptual age is defined as the gestational age plus the post-natal age). Steward et al.¹⁴ reported that preterm infants who require surgery during the first few months of life are more likely to develop respiratory complications during and following anaesthesia than are full-term infants. In a prospective study by Liu and colleagues¹⁵, infants with a history of apnoea and a postconceptual

age below 46 weeks were observed to have prolonged apnoea after anaesthesia and surgery. Welborn reported that apnoea and/or periodic breathing did not occur in former premature infants whose conceptual age was more than 44 weeks, and who were without any major systemic disease at the time of surgery¹⁶. Kurth et al. observed an incidence of postanaesthesia prolonged apnoea in former preterm infants whose conceptual age was as old as 55 weeks and as late as 12 hours after anaesthesia¹⁷. The need for postoperative monitoring is also appropriate for a Sudden Infant Death Syndrome (SIDS) sibling less than 6 months old. The use of intravenous caffeine to stimulate the respiratory system in former preterm infants has been recently studied¹⁸. However, this intervention should still not change the need for postoperative monitoring. The age at which the premature infant attains physiologic maturity and no longer presents an increased risk must be considered individually, with attention given to growth and development, persistent problems during feeding, time to recover from upper respiratory infections, apnoeic history and presence or absence of metabolic, endocrine, neurologic or cardiac disorders. Infants with a history of respiratory distress syndrome, bronchopulmonary dysplasia, apnoea or aspiration with feeding should be symptom free before proceeding on an outpatient basis. Each institution must develop a middle ground between the conservative 60 weeks and the 44–46 weeks age range. Until more extensive meticulous prospective studies are carried out, it seems prudent to admit to the hospital all ex-premature infants less than 50 weeks postconceptual age so that they may be monitored for possible apnoea, bradycardia and oxygen desaturation. The responsibility of the medical team is to screen these high-risk patients before a decision can be made to proceed with ambulatory surgery.

The very old

With the increasing geriatric population and as more procedures continue to be shifted to the outpatient setting (e.g. herniorrhaphy, cataract extraction, transurethral resection of the bladder), it is not uncommon for patients in their 80s and 90s to be scheduled for ambulatory surgery. The advantages of managing geriatricians as outpatients are: minimizing their hospital exposure to nosocomial infections; iatrogenic errors and postoperative confusion. Chung et al.¹⁹ reported that cognitive changes occurred in the elderly even after cataract extraction under retrobulbar block and intravenous sedation. The ability for the elderly to be restored to their own familiar environment, resume their daily activities and schedule (including taking chronic medications) with their support systems cannot be overemphasized. The disadvantage of the outpatient setting for elderly patients is that many times that support system (e.g. an elderly spouse) may not be capable of managing a postoperative patient. Ensuring that the patient is discharged to a responsible home setting will further minimize complications. Some elderly patients would benefit from admis-

sion after outpatient surgery if their medical conditions required further intervention postoperatively. Patients who received general anaesthesia may have prolonged recovery and confusion postoperatively, and may benefit from a longer postoperative period of observation²⁰. Regardless of the anaesthetic technique chosen, the physician must be prepared to deal with problems related to coronary artery disease, hypertensive and chronic obstructive disease among other disorders. Studies have found only a weak correlation when the relationship between age and the rate of complications was evaluated^{21–23}.

The same recommendations that exist for selecting all outpatients certainly apply to neonates and geriatrics: if their systemic diseases are well controlled and further hospitalization would not be necessary for their postoperative care then they are suitable outpatient candidates. This underscores the necessity for prescreening patients via the various modalities previously mentioned.

Insulin-dependent diabetes mellitus

Because the spectrum of diabetes varies widely among patients, the concern about managing diabetics as outpatients centres around the fact that the disease is characterized by metabolic abnormalities that are not always predictable. Even the stress of minor surgery can tip the scale of glucose homeostasis out of control. Diabetic patients can benefit from outpatient management, because many are knowledgeable and proficient in their own insulin regimens and would prefer to take charge of their own treatment as soon as possible. Minimizing exposure to nosocomial infections in this population, as is the case with other potentially immunocompromised patients, is also an advantage of ambulatory surgery. Therefore, through the pre-screening process, some evaluation must be made of each patient's insulin requirements, diabetic control, prior hospitalizations due to diabetic ketoacidosis or symptomatic hypoglycaemia, along with any associated autonomic dysfunction, cardiac, renal or vascular disease²⁴. An accepted method of managing diabetics is to schedule them early in the day, hold the a.m. dose of insulin and only after the patient has arrived in the ASC start an intravenous solution, test the serum glucose and administer an appropriate dose of insulin. The obvious concerns are maintaining glucose levels in a fasting patient and in whom postoperative nausea and vomiting may preclude significant oral intake. Should the patient be scheduled for later in the day, a light breakfast with partial insulin coverage is an accepted method of management. Once the patient has recovered, the patient should receive instructions prior to discharge regarding insulin coverage based on a recent serum glucose determination. Some patients will only need to take a partial dose of their longer acting insulin, while others would be adequately treated with short-acting coverage of insulin. Treatment should be individualized.

Child with URI

It has been estimated that the average pre-school child has approximately 5–10 colds a year. Therefore, scheduling a child for elective surgery during a safe period may be an impossible task. Accordingly, evaluating the child with signs and symptoms of an URI is important in reaching a decision whether it is safe to proceed with anaesthesia and surgery. The points to consider before making a decision in a child that presents with a URI, or runny nose, is that these symptoms may be completely benign, a noninfection condition — allergic or vasomotor (crying) rhinitis, in which elective surgery may be safely performed or that the presentation of a URI, runny nose, may be a prodrome, or actually be, an infectious process, in which it would be prudent to cancel elective surgery. What are the concerns about anaesthetizing a child with a URI? A number of studies reported in the literature that children with URIs had higher incidence of respiratory complications in the operating room, including laryngospasm, bronchospasm, stridor, breath-holding and transient postoperative hypoxaemia^{25–27}. Most recently, Cohen et al.²⁸ reviewed a large prospectively collected paediatric database including 20 876 children without URIs and 1283 children with URIs for risk assessment of respiratory adverse events. They concluded that children with a URI were 2–7 times more likely to experience a respiratory-related event perioperatively. The risk was higher (11 times) in those who underwent general endotracheal anaesthesia. Because of these concerns, evaluating the child for any constitutional signs or symptoms as well as a change in activity and appetite can give the clinician a better gauge in deciding whether to proceed or not. Tait and Knight characterized a URI to include at least two of the following: sneezing; rhinorrhea; congestion; non-productive cough; low-grade fever <101°F; laryngitis, sore or scratchy throat²⁵. Depending on the severity of these symptoms, it may be prudent to postpone elective outpatient surgery for at least one month. Of course, it may not always be feasible to postpone in those cases where the surgical procedure, such as myringotomy and pneumatic tube placement make actually be part of the therapy. Many anaesthesiologists have proceeded under these conditions for a low-risk procedure under general anaesthesia by mask, but recognize that they may be faced with a difficult airway. Intravenous access and possible premedication with anticholinergics may be useful under these circumstances.

Malignant hyperthermia

Fortunately, the incidence of malignant hyperthermia (MH) is rare occurring anywhere from 1 : 15 000 cases in children to 1 : 50 000 in adults. The pattern of responses of these patients under a variety of situations are now better understood. Malignant hyperthermia susceptibility (MHS) is not a contraindication to outpatient surgery. Postponement of elective surgery further sensitizes these patients to the belief that they are unable to obtain straightforward quality medical care. Patients with

known MHS could be scheduled since dantrolene availability is recommended for all anaesthetizing areas in sufficient quantity to properly treat an adult patient. Just as all anaesthetizing areas have a cardiac defibrillator immediately available, dantrolene has a similar role in a patient who is healthy in every other respect who, when properly and promptly treated for an unexpected MH episode, should survive and recover uneventfully. Should MH occur, treatment should be reversal of metabolic crisis, stabilization and transfer to a hospital bed for further observation and treatment. MHS patients do well with nontriggering agents, even without the prophylactic use of dantrolene²⁹. Patients undergoing MH muscle biopsies are done routinely as an outpatient procedure either under general or regional anaesthesia and are sent home 4–6 hours later, whether muscle biopsies are positive or negative. No major problems have been reported from centres that perform these procedures. In a large group of MHS who were anaesthetized with trigger-free anaesthetics, four out of 956 patients had modest febrile reactions in the PACU, three of which were treated with I.V. dantrolene; all recovered uneventfully²⁹. Where should patients who are MHS be managed? Many feel that a hospital-based or separate unit would be better than a FASC should there be a need to admit and observe these patients. Since capnography is currently mandated as part of the monitoring for general anaesthesia, a rising end-tidal CO₂ would indicate a hypermetabolic state and strongly raise the suspicion of MH, even without the immediate confirmation of an arterial blood gas measurement, equipment which may not be available in all surgery centres.

The issue of masseter spasm or trismus, and resistance to opening the jaw continues to be a controversial area. At the present time nobody can decide which of these patients is susceptible to MH and are experiencing the beginning of a clinical MH episode and which are normal. Kaplan has summarized three different options³⁰:

- (1) stop the anaesthesia, treat for MH, monitor appropriately and later perform MH muscle biopsies if at all possible.
- (2) continue with safe agents, monitor appropriately and perform muscle biopsy.
- (3) continue triggering agents, monitor appropriately and perform muscle biopsy.

Appropriate monitoring includes end-tidal CO₂, temperature, oxygen saturation, pulse rate and blood pressure, muscle tone in other areas of the body, colour of the urine and electrolytes. Gronert et al. have suggested that anaesthesia may be continued with non-triggering agents if the only manifestation is trismus³⁰. As the severity of resistance to opening the mouth increases, the likelihood of MH and therefore suspicion for MH should be increased. Most occurrences of trismus feature only trismus, and other factors being normal, patients could be discharged. It is hard to predict how long a postoperative observation is necessary. Flewellen has suggested an observation period of 4–6 hours, provided that no

Table 3. Recommended scheme for minimal preoperative testing

	Hgb	WBC	Elect	Creat/BUN	Gluc	EKG	X-Ray	PT/PTT	Preg	Other
Neonate	X									
Age < 40	X									
Age 40–50	X					±				
Age > 60	X					X	X			
Cardiovascular disease				X		X	X			
Pulmonary disease						X	X			
Malignancy	X	X								
Hepatic disease								X		SGOT/AlkPtase
Renal disease	X		X	X						
Bleeding disorder								X		Platelets, bleeding time
Diabetes			X	X	X	X				
Smoking > 20 pack yr	X						X			
Possible pregnancy									X	
Diuretic use			X	X						
Anticoagulant use	X							X		

Sources: Modified from Roizen³⁴, Kaplan et al.³² and Blery et al.³⁵

Hgb, haemoglobin; WBC, white blood count; Elect, electrolytes; Creat/BUN, creatinine or blood urea nitrogen; Gluc, glucose; EKG, electrocardiogram; PT, prothrombin time; PTT, partial thromboplastin time; Preg, pregnancy test; SGOT, serum glutamic oxaloacetic transaminase; AlkPtase, alkaline phosphatase; X, obtain.

evidence of MH has arisen, and informs the responsible party of early signs of MH, the ability to communicate with a physician and be transported quickly back to a medical facility³¹. This particular scenario underscores the changing face of the ambulatory surgery population.

Laboratory testing

The history and physical examination are still the best means of preoperative screening and should lead the practitioner to order appropriate laboratory tests. Batteries of screening tests are not cost-effective, do not provide medicolegal protection and in fact may harm the patient^{32,33}. Roizen et al. has extensively studied this area and has provided an elegant review of epidemiological studies in aiding the clinician to select appropriate laboratory tests³⁴. Tests should be obtained only when their results will be part of the decision making. In fact, many centres have no mandated laboratory tests. Each centre must comply with their state regulations and medical staff to establish the necessary preoperative testing. Table 3 provides clinical recommendations for laboratory evaluation based on current knowledge of these tests^{32,35}. The acceptable time frame for laboratory tests should be established by each facility. Acceptable time frame ranges from 14–30 days, unless the patient's underlying disease would dictate that testing be repeated closer to the scheduled procedure; chest radiographs and electrocardiograms taken within the past six months are acceptable if they were normal and the patient had no interval changes. The change in laboratory testing reflects the drive for appropriate patient preparation as well as cost containment in ambulatory surgery.

Conclusion

Where does the future lie for outpatient surgery? One of the most critical questions is where the outer line will be

drawn from the limits of inpatient to outpatient shift. The number of procedures have climbed exponentially to over 50%. Will this climb continue or is it about to peak? Payors continue to put pressure on hospitals to do as much outpatient surgery as possible. Patients and their families have already adapted to the concept of short-stay and prefer not to be hospitalized if they can avoid it. The 1990s are not likely to see growth rates of 10% a year as in the early 1980s. In addition, as outpatient expenditures continue to rise, the focus of public and private utilization review and cost containment efforts inevitably will shift to the outpatient side. Technologies are likely to be more closely monitored and efficacies will need to be demonstrated. Payment reform, such as the proposed Ambulatory Patient Groups (APGs) will affect the outpatients just as Diagnostic Related Groups (DRGs) affected inpatient reimbursement. These changes may reduce the rate of growth in the most specialized procedures, but are unlikely to result in a reduction of outpatient revenues, or a reversal in the move from inpatient to outpatient surgeries. On the contrary, the number and proportion of surgeries performed in outpatient settings can be expected to increase in the future due to two major trends: the development of increasingly sophisticated technology will increase the type of surgeries that can be done on an outpatient basis and the increasing prevalence of managed care, with its incentives to serve patients in an outpatient setting where possible and appropriate, will continue to result in a shift from inpatient to outpatient surgery.

We are witnessing the changing face of ambulatory surgery underscored by the changing patient composition. It is the responsibility of the medical community to respond to these changes by upholding quality of patient management, and ensuring that patients are appropriately screened, selected and prepared for ambulatory surgery.

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