Lesson S37: PreAnesthetic Assessment of the Elderly Patient for Hernia Repair

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REVIEW DATE: June, 2014

Read this article, reflect on the information presented, then go online and complete the lesson post-test and course evaluation before the termination date below. (CME credit is not valid past this date.) You must achieve a score of 80% or better to earn CME credit.

TIME TO COMPLETE ACTIVITY: 2 hours
RELEASE DATE: July 1, 2014
TERMINATION DATE: August 31, 2015

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Professional Gaps

As part of the Choosing Wisely Campaign, the American Society of Anesthesiologists and other professional organizations have recently issued new guidelines addressing indications for ordering appropriate preanesthetic tests. Many practitioners, including anesthesiologists, internists and surgeons, are unaware of these practice parameters.

Learning Objectives

At the end of this activity, the participant should be able to:

1. Identify patients for whom no testing is required
2. List criteria when serum chemistries should be ordered
3. Describe circumstances when cardiac testing would provide important information
4. Indicate patients for whom a chest X-ray should be ordered
5. Cite recent guidelines from the ASA
6. Understand how general, "routine" testing came into practice
7. Cite the incidence of positive results that may impact outcome or change an anesthetic plan
8. Identify situations in which a test should be done
9. Understand the importance of a physical examination
10. Indicate tests that should be ordered for a male patient with diabetes (ASA 2) for cholecystectomy

Case History

A 79 year old man presented to the preanesthetic assessment clinic prior to repair of a right inguinal hernia. He was in good health apart from some arthritis and exercised daily. He occasionally took naproxen, the last time being about 3 days ago, but no other medications including herbal
preparations. Ten years prior, he had a repair of a left sided hernia with no complications. He had no allergies. He did not smoke and drank 2-3 glasses of wine daily. He saw his internist annually, the last time being 4 months ago. At that time, cardiogram and electrolyte panel were reported as normal. He had an order form from his surgeon for all routine tests including a chest X-ray and stress test.

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**Introduction**

“On feeling the pulse of a 21 year old...I found it to be small, weak, and intermitting. I told the patient he had nothing to apprehend. His pulse improved. He inhaled the chloroform, His teeth were extracted. He woke up. Now, if the inhalation had commenced without inquiry, the syncope would have had the appearance of being caused by the chloroform.” —- John Snow

John Snow anesthetized Queen Victoria for the birth of her son Prince Leopold in 1853, and is likely to be one of the first physician anesthesiologists. Known to be a meticulous clinician, he emphasized the need to communicate with patients who were about to undergo surgical procedures. As noted above, he correctly pointed out that a physical examination prior to administering chloroform would prevent potential problems and allow for proper analysis of the patient’s vital signs and overall condition during the anesthetic process.

A half century later, in New York, Dr. T. Drysdale Buchanan, a recent graduate of New York Medical College, became interested in the practice of anesthesia, a somewhat maligned specialty with training still in its infancy. Paul Wood memorialized Buchanan in a letter stating: “I was a junior at the old Homeopathic College (around 1898) and, at the time, it was the practice to take on four seniors to administer the anesthetics for the clinics. Naturally, I was anxious to be selected as one of the four who were to anesthetize for old Dr. Helmuth’s clinic. In trying to obtain this experience, I finally importuned a junior surgeon and asked him if he would allow me to give an anesthetic and he said, ‘Yes indeed, you bring me a case for surgery and I will let you give the anesthetic.’ So I did. That was about the only instruction I had in anesthesia, more than most internes received at that time.”

Within 6 years, Buchanan had established the first department of anesthesia with himself as the professor, dedicated full time to the practice of anesthesia. He was the first board certified physician of the American Board of Anesthesiologists and also served as president of the American Society of Anesthesiologists. His precedent of bargaining with surgeons for the right to obtain patients may have spawned the later practice of general practitioners referring patients to surgeons who would then return to the former for evaluation and testing prior to the procedures. This practice gained momentum until it became no longer customary for referring doctors to assist in the operating room and fee splitting was disallowed.

**Changing Times**

During the first three quarters of the 20th century, hospital beds were in abundance. It was not unusual for patients to spend weeks in hospitals for even relatively minor procedures. Patients were often admitted days before surgery and clinicians believed that ordering large arrays of tests might
detect abnormalities that could increase morbidity or mortality perioperatively. Moreover, as long as the patient was staying in house, tests could substitute for annual physical examinations and might uncover other morbidities that could be operated during the hospitalization. Long term care facilities were few and far between and elderly relatives were often cared for at home. A 2-3 week hospital sojourn allowed respite for families who could then take an annual vacation. Back and forth referral of patients between specialists was believed to improve overall patient care and maintain a continuity of consultation patterns. Routine testing was developed and considered to include electrocardiogram (EKG,) complete blood count, urinalysis, chest X-ray, electrolyte screen, blood urea nitrogen (BUN) and creatinine, blood glucose level, type and screen and a coagulation profile (PT/PTT). Performing these multiple tests also generated income for the hospital. Moreover, the risk of anesthesia was greater as the evanescent agents of today were not available, although it is doubtful if the results of any these tests could identify and thus mitigate perioperative complications.

Into a New Era

As costs began to rise, the 1990’s became a time when questions were asked as to the validity of all these tests.4-6 Hospitals with enormous bed sizes were forced to downsize and ambulatory surgical and procedural admissions became increasingly popular and grew from close to 0% to almost 75%. Reimbursement was restructured. With passage of Public Law 92-603, preadmission evaluation for certain groups of patients became mandatory. Insurance carriers, especially Medicare and Medicaid services (CMS), asked for justification of hospital days and tests, especially repeat tests and often denied the claims, especially based on age alone. Anesthetic agents became safer, returned the patient to the preoperative state quicker, and a more comprehensive understanding of pain management and control of nausea and vomiting allowed for earlier discharge. Surgical and procedural techniques became less invasive. The idea of “medical clearance” was questioned, as was need for general application of so-called “routine tests”. Hospitals stays were not without risks, including infection. In a down economy, absence from work was costly.

Nevertheless, change is rarely welcome and it is not surprising that patients, health care practitioners and hospital administrators still cling to older and accepted practices. But evidence based medicine has become the mantra of today’s practice. Financial considerations are often a motivating factor as deductibles and co pays increase, requiring the patient to contribute more to care. Reevaluation and integration of perioperative information from all sources is necessary to improve patient care. Efforts must also be focused on compiling and interpreting perioperative information, especially the results of physical examinations and history performed in a preanesthetic assessment clinic, the physician’s office, the holding area prior to a procedure or available in an electronic medical record. Communication becomes ever more important. The clinical and cost effectiveness of routine laboratory testing deserves even closer examination.

Evidence Based Studies

What is the primary purpose of a preanesthetic visit? Many patients believe, often on information from doctors’ offices, that they must give blood, undergo an electrocardiogram (EKG) and have a chest X-ray. Rarely can they cite the tests that their primary physician or surgeon may have ordered or the purpose of those tests. Some believe the preanesthetic visit is a substitute for an annual physical examination. An early large study challenging the usefulness of routine preoperative laboratory screening was published in 1985.4 The value of screening 2,000 preoperative patients using the “routine” panel over a four-month period was evaluated. The authors estimated that sixty percent of
the tests would not have been performed if testing had only been done for recognizable indications, and only 0.22% of these revealed abnormalities that might influence perioperative management and these slight deviations were neither acted upon nor produced adverse consequences. Moreover, no changes were made to the planned procedure. Thus, the conclusions drawn almost 30 years ago were that, in the absence of specific indications, routine preoperative laboratory tests contribute little to patient care, and can reasonably be eliminated. Even when an irregular result was revealed, it was mostly ignored, either because the health care worker did not read the result or deemed it inconsequential.

Two years later, a second review of 2,570 patients undergoing elective surgery, uncovered 104 abnormal and significant test results among 5,003 tests performed. It was determined that only 4 patients would have benefited from "routine" laboratory testing. In a third electronic record study of 1,044 patients (age range 0-95) who had no testing, there were no deaths or major perioperative morbidities. No blood transfusions were necessary. Intraoperatively, 17 laboratory tests and 1 electrocardiogram were obtained and 3 results were abnormal. Postoperatively, 42 blood tests were done and showed abnormal results in 5 tests (3 with abnormal Hb level, 1 with abnormal sodium, and 1 abnormal arterial blood gas). Conclusions drawn were that history and physical examination were sufficient to determine what, if any, tests were indicated. Despite the fact that a systematic review of the evidence showed that a wide range of abnormal results can be obtained from routine testing even in healthy patients, the importance of these findings was uncertain. Changes in management occurred in a very small percentage of patients. The usefulness of preoperative tests to predict adverse postoperative outcomes in asymptomatic patients appeared to be either weak or non-existent. Little or no benefit could be conferred to patients.

The question also arises as to the ability of physicians to evaluate tests that they may have ordered. How well can an orthopedist or even an anesthesiologist, for example, interpret the nuances of a chest CT scan or even a stress test? Moreover, physicians may not be good at evaluating the preoperative tests that they have ordered. In a study in which the records of 3,782 elective surgery patients were reviewed, only 10 of 160 patients with abnormal test results were treated for such abnormalities. The lack of treatment of identified abnormalities therefore raises the issue of increased legal liability. Physicians do not always follow up on tests ordered, sometimes because their office manager has used a template, signed previously by the doctor and simply indicated a battery of tests to be done. Although an argument has been made that failure to perform tests might result in liability, a recent collaborative discussion revealed that to date there have been no adversarial consequences in the United States related to lack of testing in patients in whom such evaluations were not indicated by history or physical examination. (The collaborative event was held on April 30th, 2014, at the New York Academy of Medicine.)

**Cost Considerations**

Routine costs for preoperative testing amount to about 60 billion dollars annually in the United States. Individual prices taken from a recent hospitalization are shown in Table 1. If bundling is incorporated into the health care system and a set sum is applied to each procedure, it is clear that there will be little remaining income for physicians.
It should be noted that stress testing is acknowledged by the American College of Cardiology to have restricted benefit but is still frequently ordered. A battery of routine tests including complete blood count, basic metabolic panel, chest X-ray and EKG bills cost about $1600.00 which does not include the fee for specialist interpretation. In some instances the Center for Medicare/Medicaid Services (CMS) and insurers will not reimburse for repeat testing and for tests based on age alone, placing the burden of payment on the patient or simply increasing non reimbursable costs or co-pays. In other situations, CMS shoulders the enormous costs, almost arbitrarily. At present there seems to be little consistency.

The type of surgery is also important in risk stratification. For cataract surgery, performed usually in older patients for whom testing has been more frequently advocated, a systematic review of 3 randomized trials involving > 20,000 patients did not show any difference in the incidence of adverse events between those who were tested versus those who did not have preoperative testing. Rather, preoperative testing resulted in a 2.5-fold increase in the cost. Also, 30-day events rates were not different in ambulatory surgery patients with or without preoperative testing.

### What to Order: Choosing Wisely®

National guidelines have consistently recommended minimizing pre-operative testing in lower-risk patients, since it provides little or no yield in altering the operative course and is very costly. Through the American Board of Internal Medicine (ABIM) Foundation’s Choosing Wisely® campaign, nine specialty societies have published lists of “5 things” to draw attention to diagnostic and therapeutic services which may be overused. Noting that 750 billion dollars are spent on unnecessary tests (that is 1/3rd of all health care costs), this educational initiative aims to help physicians and patients engage in conversation to reduce overuse of tests and procedures and support physician efforts to ensure that patients make smart and effective care choices. To date, over 50 professional societies have released statements and 8 others have expressed their intention to do so. Excessive pre-operative testing has been included in lists from the American Society of Anesthesiologists, the Society for Vascular Medicine, and the American College of Radiology. Despite the recommendations, unnecessary pre-operative testing remains common.

### What is indicated?

With evidence showing that testing yields little helpful information, what should physicians do? A good history and physical examination followed by a review of a patient's chart are undoubtedly the most important routine requirements. Only then should specific tests be requested. Approximately 5% of healthy patients have abnormal test results related usually to arbitrary cut off points that define the range of values and vary between hospitals and laboratories. For example, a Hb level of 10.8gm will be flagged as low and hence abnormal but will rarely trigger any treatment and does not change the anesthetic or procedural management, especially if the operation planned laparoscopic and relatively low risk. However, abnormal laboratory values, with very low predictive values, may result in further unnecessary workup and delays, adding significantly to cost and patient apprehension. For example, an

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### Table 1. Representative charges from a New York Hospital (2013)

<table>
<thead>
<tr>
<th>Test</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest X-ray</td>
<td>$128.00</td>
</tr>
<tr>
<td>EKG</td>
<td>$216.00</td>
</tr>
<tr>
<td>Electrolyte panel</td>
<td>$626.00</td>
</tr>
<tr>
<td>Complete blood count</td>
<td>$156.00</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>$85.00</td>
</tr>
<tr>
<td>Stress test</td>
<td>$2300.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$3511.00</strong></td>
</tr>
</tbody>
</table>
EKG reading of “non-specific ST, T wave changes” carries little import for the anesthesiologist but may cause anxiety in an elderly person who perceives themselves in good health. While a blood sugar level of 140mg/dl is above the cutoff point of around 110mg/dl for most laboratories, for an individual patient that may be a normal level.

Advancing age, especially 70 years or older, is associated with increased morbidity and mortality. However, most people in this age group have co morbid conditions, and it remains unclear if periprocedural complications are secondary to co morbid conditions or age.

**Specific Tests**

**Complete blood count**

While routine CBC is not indicated, especially in children, recent guidelines recommend preoperative hemoglobin testing if the history is suggestive of underlying anemia or if a significant blood loss is anticipated. Severe leukopenia or leukocytosis, in the absence of any history to the contrary, is extremely low and rarely leads to a change in patient management. However, prior to surgical implantation of any device such as a joint or deep brain stimulator, freedom from infection elsewhere in the body should be ascertained. Similarly, thrombocytopenia is found in fewer than 1% of healthy elective cases and also is seldom acted upon.

**Electrolytes**

Unsuspected electrolyte abnormalities occur in about 1.4% of healthy elective surgery patients, most commonly mild hypokalemia in patients maintained on hydrochlorothiazide. Although hypokalemia is considered a minor risk factor for perioperative cardiac complications based on the Goldman risk index, no studies indicate a relationship between hypokalemia and perioperative morbidity and mortality. It would be reasonable to use a balanced salt solution such as lactated Ringer’s intraoperatively rather than normal saline for anyone taking this medication.

Hyponatremia is common in elderly women, especially after neurosurgical procedures. If there is no change in the level of consciousness and mentation, no changes are likely to be made beyond the avoidance of fluid replacement with dextrose in water.

**Creatinine and BUN**

Elevated creatinine and BUN levels may be found in 0.2% to 2.4% of asymptomatic patients, a percentage that increases with age to about 9% in persons age 60. If dye studies are contemplated in older patients, assessment of renal function is reasonable.

**Blood glucose**

Hyperglycemia is found in 1.8% to 5.5% of patients. By the age of 60, almost 25% of patients have some degree of hyperglycemia (>120mg/dl), especially if they are obese or have a positive family history. There is a wide range in what laboratories consider “normal”. The time of day and degree of fasting when the specimen was drawn must also be considered. Administration of corticosteroids and stress also increase blood sugar levels to a variable degree. It is probably important to attempt to assess what the patient may consider his/her “normal” range and maintain a value closer to that level.
rather than to the laboratory cutoff value. Monitoring blood sugar levels is more important in
neurosurgical procedures and those with a high potential for wound infection.

Liver enzymes

Liver enzymes, aspartate aminotransferase [AST], and alanine aminotransferase [ALT] are elevated in
approximately 0.3%. In the athlete who may recently have participated in a major event such as a
marathon race or iron man competition, increases in enzymes may be quite high but subside within 24-
48 hours. Again, history is a key consideration and if the patient is asymptomatic without jaundice,
there is no evidence that mild and/or transient elevations in liver enzymes are associated with an
increased risk of perioperative morbidity and mortality.

Coagulation profile

Abnormal bleeding time, prothrombin time (PT), and activated partial thromboplastin time (aPTT)
results are abnormal in less than 1% of patients without a history of a bleeding diathesis, anticoagulant
therapy or liver or renal disease. Bleeding time is not a useful predictor of perioperative bleeding risk
and does not exclude the possibility of excessive bleeding. Coagulation studies are recommended in
less than 2-3% of patients particularly those who may have a predictive history (liver or renal disease)
and in neurosurgical patients with brain tumors, as this pathology may be a source of both anti and pro
couagulant factors.

That withstanding, an increasing number of patients are maintained on medications and herbal
preparations with anticoagulant effects. Aspirin and non-steroidal anti-inflammatory drugs (NSAIDs) as
well as some herbs impair platelet function by inhibiting platelet cyclo-oxygenase (COX). Aspirin
inhibits COX irreversibly while NSAIDs do so reversibly. The antiplatelet effects of aspirin persist about
7 days, whereas platelet function returns to normal within 3 days after stopping NSAIDs. Despite their
widespread use, only five cases of vertebral canal hematoma in patients receiving aspirin or NSAIDs
alone have been reported. The American Society of Regional Anaesthesia has endorsed the safety of
central neuraxial block in patients on aspirin and NSAIDs. Horlocker noted that while NSAIDs did
not increase the frequency of minor hemorrhagic complications, increased age, larger needle gauge,
multiple punctures and number of needle passes, larger volume of injectate and accidental dural
puncture were all contributors.

Recommendations on stopping clopidogrel have evolved from studies conducted on patients
undergoing cardio-thoracic surgery. There is no data available on the effect of clopidogrel in other
practices. One orthopedic survey indicated that increased bleeding has not been found in patients who
continued clopidogrel peri-operatively. There have been three cases of vertebral canal hematoma
associated with central neuraxial block in patients taking clopidogrel and two cases of major bleeding
following lumbar sympathetic block (one was fatal). The clopidogrel datasheet states that it should be
discontinued 7 days before surgery, a time period that should also be observed before carrying out any central neuraxial or peripheral blocks. (See Table 2.) Hospitals should adopt policies to ensure
that clopidogrel is discontinued preoperatively and if an antiplatelet effect must be maintained, aspirin
81mg can be substituted. Cardiology consultation is recommended for patients in whom a drug eluting
stent has been recently placed as discontinuation of clopidogrel can have devastating results.
Table 2. Guidelines for neuraxial blocks in anticoagulated patients

<table>
<thead>
<tr>
<th>DRUG</th>
<th>GUIDELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin</td>
<td>Discontinue chronic warfarin therapy 4–5 days before spinal procedures. Ensure INR is within the normal range.</td>
</tr>
<tr>
<td>Antiplatelet medications</td>
<td>No contraindications with aspirin 81mg or NSAIDs. Thienopyridine derivatives (clopidogrel and ticlopidine) should be discontinued 7 days and 14 days, respectively, prior to procedure. GP IIb/IIIa inhibitors should be discontinued to allow recovery of platelet function prior to procedure (8 hours for tirofiban and eptifibatide, 24–48 hours for abciximab).</td>
</tr>
<tr>
<td>Thrombolytics/fibrinolytics</td>
<td>No data to suggest a safe interval between procedure and initiation or discontinuation. Follow fibrinogen level; observe for signs of neural compression.</td>
</tr>
<tr>
<td>LMWH</td>
<td>Delay procedure at least 12 hours from the last LMWH dose. For “treatment” dosing of LMWH, at least 24 hours should elapse prior to procedure. Hold LMWH for 24 hours after the procedure.</td>
</tr>
<tr>
<td>Unfractionated SQ heparin</td>
<td>No contraindications if total daily dose is &lt;10,000 units. Higher doses - manage according to IV heparin guidelines.</td>
</tr>
<tr>
<td>Unfractionated IV heparin</td>
<td>Delay spinal puncture 2–4 hours after last dose, document normal aPTT. Heparin may be restarted 1 hour following procedure.</td>
</tr>
</tbody>
</table>

NSAIDs = nonsteroidal antiinflammatory drugs; GP IIb/IIIa = platelet glycoprotein receptor IIb/IIIa inhibitors; INR = International normalized ratio; LMWH = low-molecular-weight heparin; aPTT = activated partial thromboplastin time.


Urinalysis (UA)

Urinary tract infection (UTI) is best diagnosed by history although it is unclear if asymptomatic UTI and wound infection correlate. An economic analysis showed that to prevent a single wound infection, approximately $1.5 million must be spent on UAs. Therefore, urine analysis should not be routine for asymptomatic patients.

Pregnancy testing

History alone has been shown to be unreliable in determining pregnancy. Because a pregnant state has been shown to affect the management of anesthesia and decision making in all cases, the American Society of Anesthesiologists recommends pregnancy testing for all women of child bearing age at all facilities when anesthesia is to be administered. First trimester exposure to benzodiazepines (mainly diazepam and chlordiazepoxide) in utero may result in birth defects, although more recent studies have not confirmed these earlier findings.

Propofol is commonly used for induction and sedation. It is the only sedative agent that carries a pregnancy category B rating. (Category B: animal reproduction studies have failed to demonstrate a
risk to the fetus and there are no adequate and well-controlled studies in pregnant women; OR; Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester).  

**Electrocardiography (EKG)**

Abnormal ECG findings are found in 4.6%-44.9% of healthy patients. As a result, further testing is carried out in 0.46%-2.6% of patients. The value of a preoperative EKG in determining if a patient with previous myocardial infarction or dysrhythmia is at risk for postoperative complications was studied by Noordzij et al who used multivariate logistic regression to evaluate the relationship between EKG abnormalities and cardiovascular death. In a retrospective study of 23,036 patients who underwent 28,457 surgical procedures, a total of 199 in-hospital patients died of cardiovascular complications (0.7%). A higher incidence of cardiovascular death was observed in patients with an abnormal EKG (1.8%) than in those with normal EKG results (0.3%); adjusted odds ratio [OR] 4.5 (95% CI 3.3-6.0). All of these patients underwent high risk surgery. There was no significant difference (0.5%) in the incidence of cardiovascular death in patients, with or without EKG abnormalities, who underwent low or low- to intermediate-risk surgery.

Routine EKG is not recommended in asymptomatic patients without any clinical risk factors who are to undergo low-risk surgery according to the American College of Cardiology (ACC)/American Heart Association (AHA) guidelines. The AHA does recommend EKG in all severely obese patients (body mass index ≥40kg/m²) with at least one other risk factor.

**Chest X ray**

Approximately 22% of patients > 60 years have abnormal findings on chest X ray as compared to 0.3% of those who are younger. According to the Practice Advisory of the ASA, abnormal findings were reported in 7.7% - 86% of patients but only resulted in postponements, cancellations, or changes in management in 0.5% - 17% of cases with abnormal findings. The AHA recommends chest X-ray to assess for heart failure and chamber enlargement in severely obese patients (body mass index ≥ 40kg/m).  

A meta-analysis of 21 studies that included 14,390 routine chest X-rays showed that only 140 of 1,444 abnormal results were not clinically expected and that only 14 of these results affected physicians’ decisions in managing their patients. Thus, with such low yield chest X ray is not indicated at any age in asymptomatic patients.

**Timing of Tests**

Hospitals often insist that tests be conducted in their laboratories, and do not accept values from outside sources. However, Medicare and Medicaid, as well as other insurers, either refuse or are unwilling to pay for repeat tests. The reliability of previous laboratory results, performed within 4 months before a procedure, was supported by a study in which 7,549 laboratory results of 1,109 patients were reviewed. Forty seven percent of the test results duplicated those obtained within 1 year. Only 13 (0.4%) repeated values were abnormal, and these could have been predicted by history and physical findings.

Guidelines from the ASA acknowledge that tests obtained at another site are admissible.
Indicated tests: Procedures and Patient Co Morbidities

Several studies, both recent and 2 decades ago, indicate that postoperative complications are strongly associated only with higher ASA classification and increased duration and severity of the surgical procedure.\(^{14,15}\) Thus, as the so-called routine preoperative test results are unlikely to reduce postoperative complications, identification of patients where meaningful information may be obtained is warranted. Airway examination with documentation and recording of vital signs are considered essential information. A whimsical note regarding blood pressure was made by Harvey Cushing who had seen blood pressure measured in Europe when he visited the Ospidale di St Matteo in Padua and was impressed with an adaptation of Scipione Riva-Rocci’s device. He later introduced it as a requirement during anesthetic administration. Later, in 1930, he wrote:

“...I am not so sure that the general use of a blood pressure device in clinical work has done more good than harm. Just as Floyer’s pulse watch led to two previously unknown diseases, tachycardia and bradycardia, so the sphygmomanometer has led to the uncovering of the diseases (God save the mark) of hypertension and hypotension, which have vastly added to the number of neurasthenics in the world.”\(^{31}\)

The above observation notwithstanding, requirements prior to anesthesia include:

1. History and physical examination before any tests are ordered.
2. Identifying and documenting on the patient record the procedure to be performed.
3. Patient consent, after explanation of the risks and benefits of the anesthetic technique and the options available.
4. Tests as indicated and reviewed by the health care team.
5. Communication with other members of the perioperative team.

Table 3 provides some useful references reviewing current guidelines. A general scheme for testing that is supported by the ASA and other organizations is summarized as follows:

- EKG should be performed in older patients (age not specified, > 50 in some centers) who are undergoing more invasive procedures, or who give a recent history of heart problems.
- Potassium levels in patients who have renal disease or on diuretics.
- Blood sugar levels in all diabetics on day of surgery.
- Pregnancy test in women of childbearing age.
- All other tests should be ordered when an underlying medical condition suggests that the procedure or anesthesia might be altered by an abnormal result.
- Blood should be typed and screened only when there is a potential for considerable blood loss.
- Chest X ray is not required at any age.

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**Table 3. Useful references addressing recent guidelines for minimizing preoperative testing.**

<table>
<thead>
<tr>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice Advisory for Preanesthesia Evaluation: ASA Oct 2011; Anesthesiology 2012. (With 173 references)</td>
</tr>
<tr>
<td>Updated guidelines of the American College of Cardiology/American Heart Association and European Society of Cardiology. A review by Schiefermueller J et al gives a brief summary of the guidelines and suggests a practical stepwise approach to evaluate the patient preoperatively. Angiology, February 2013 vol. 64 no. 2 146-150.</td>
</tr>
</tbody>
</table>
Medical conditions that may warrant testing include:

1. Cardiovascular disease: electrolytes, EKG, stress test (rarely)
2. Respiratory disease: chest X-ray, lung function tests (rarely if not actively wheezing)
3. Renal disease: electrolytes, coagulation profile, CBC
4. Liver disease: liver function tests, coagulation profile
5. Malignancies: CBC, electrolytes.
6. Endocrine disorders: electrolytes, CBC, EKG

These parameters are also supported in other countries as shown in Table 4. Anesthesiologists in general feel comfortable ordering fewer tests. In fact, on average, 72.5% of preanesthetic tests ordered by surgeons are considered not indicated by anesthesiologists.\textsuperscript{32}

<table>
<thead>
<tr>
<th>Table 4. Other countries also support the concept of fewer tests.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thailand:</strong> Use institution’s preop guidelines: decrease unnecessary testing and financial burden (Siriussawakul A et al. <em>Biomed Res Int</em> 2013: 2013:835426)</td>
</tr>
<tr>
<td><strong>UK:</strong> No evidence of clinical and cost effectiveness of routine preop tests (Czoski-Murray C. <em>Health Technol Assess</em> 2012; 16(50): i-xvi, 1-159)</td>
</tr>
<tr>
<td><strong>Germany:</strong> Implementation of guidelines in 2010 to decrease testing allowed more reasonable approach to preop risk evaluation (Bohmer AB. <em>Anaesthetist</em> 2014; 63(3): 198-208)</td>
</tr>
<tr>
<td><strong>Canada:</strong> Pregnancy testing indicated (Maher JL. <em>Can J Plast Surg</em> 2012; 20(3): e32-4)</td>
</tr>
</tbody>
</table>

**Management of the case presented**

The anesthesiologist ascertained that the patient was indeed in good health, walked at least 2 miles a day and could easily climb 3 flights of stairs. The hernia was reducible. The surgeon planned to use mesh and he had asked for 1 hour operating time. Vital signs were: BP 150/90, pulse 72 and regular. Room air saturation was 97%. Airway examination was MP 1, good mouth opening, intact teeth. There was no ankle swelling. After a frank discussion, the patient agreed to local anesthesia with propofol sedation. He was told that no further tests were deemed necessary and the surgeon was so informed. The latter asked only for assurance that the case would not be cancelled by the anesthesiologist if no recent EKG was in the chart. Assurance was given.

**Conclusion**

It is not uncommon for patients to undergo unnecessary testing prior to anesthesia. Rarely are significant anomalies uncovered by pre-operative tests and almost never do these anomalies alter the anesthetic or surgical procedure. Recent ASA Guidelines emphasize that it is most important to perform a history and physical examination prior to the ordering of any tests and assemble information from multiple sources. Preoperative tests should be performed on a selective basis to guide or optimize periprocedural management. Indications for the ordering of all tests should be documented. National standardization for the amount, ordering and timing of tests is still lacking.
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REFERENCES

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Post-test

1. A 79 year old woman is scheduled for a hip replacement. She has hypertension, diabetes, and receives cardiac medications and reports that she is compliant with her medications. She also takes several herbal preparations including ginseng and St John’s Wort. She saw her primary care physician about 2 weeks ago. The best course of action would be:

a. Call her primary care physician and determine what if any tests she has had done recently
b. Repeat all laboratory tests as you cannot rely on outside testing
c. Order an EKG and chest X-ray
d. Take no action as the patient reports that she is fine and always takes her medications

2. A 40 year-old married woman is scheduled for a cholecystectomy. She reports that her last menstrual period has been erratic but her last one was two weeks prior and she “knows” that she is not pregnant. The anesthesiologist should:

a. Proceed, as the patient history is most reliable
b. Assure that a pregnancy test is done prior to anesthesia
c. Postpone the procedure until after the patient’s next menstrual period
d. Not order any testing as patient is likely perimenopausal

3. A pre-operative CBC is not routinely indicated for surgery involving:

a. Children
b. Significant blood loss
c. A patient with underlying anemia
d. A patient undergoing joint implantation

4. A preoperative chest X-ray in an asymptomatic patient is most appropriate for:

a. A 50 year old male with morbid obesity
b. A 65 year old coal miner
c. A 35 year old with past history of traumatic pneumothorax
d. A 40 year old woman with a history of smoking 1 ppd
5. Postoperative complications could be likely with:
   a. ASA 2 and age 65
   b. A patient with intermittent A-fib ungergoing cataract surgery
   c. ASA 3 and age 79
   d. No correlations have been determined

6. A type 2 diabetic patient on 2 hypoglycemic agents reported that he tested his blood sugar with a finger stick two days prior with a result of 150 mg/dl. Which of the following is appropriate?
   a. A full electrolyte panel should be ordered and reviewed prior to surgery
   b. A finger stick test should be done prior to anesthesia on the day of surgery
   c. The case should be canceled pending clearance by the primary care physician
   d. Nothing is indicated and the case should proceed

7. A true statement regarding preoperative EKG:
   a. Abnormal EKG tracings may be found in almost 45% of cases
   b. All abnormalities must be investigated
   c. Preoperative changes always identify postoperative complications
   d. Postoperative complications occur independent of surgical complexity and EKG changes

8. A 32 year old woman is to undergo a renal transplant because of end stage renal disease. Indicated tests include:
   a. CBC, electrolytes, EKG
   b. Electrolytes, coagulation profile, CBC, pregnancy test
   c. History and physical is all that is necessary
   d. Liver function tests, chest X-rays, pregnancy test

9. Coagulation studies:
   a. Are indicated in all patients prior to neuraxial block
   b. Predict risk of perioperative bleeding
   c. Are recommended for patients with liver and renal disease.
   d. All of the above

10. A 72 year old male is scheduled for a total knee replacement with a neuraxial regional block. He has a history of unstable angina and is on a regimen of clopidogrel and aspirin 81mg. Prior to the procedure:
   a. Both clopidogrel and aspirin must be discontinued for 7 days
   b. Aspirin must be discontinued for 3 days and clopidogrel continued
   c. Aspirin must be discontinued for 7 days and clopidogrel discontinued for 14 days
   d. Clopidogrel must be discontinued for 14 days and aspirin continued