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SCIENTIFIC ARTICLE

Relevance of Routine Testing in Low-risk Patients Undergoing Minor and Medium Surgical Procedures

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Abstract

Background and objectives: Preoperative tests aim to reduce morbidity and mortality of surgical patients, cost of perioperative care, and preoperative anxiety. Clinical evaluation allows defining the need for additional tests and strategies to reduce the surgical-anesthetic risk. The aim of this study was to evaluate the benefit of routine preoperative testing of low-risk patients undergoing minor and medium surgical procedures.

Methods: A descriptive cross-sectional study of 800 patients seen at the preanesthetic assessment department of Hospital Santo Antonio, Salvador, BA. Patients with physical status ASA I, aged 1-45 years and scheduled to undergo elective minor and medium surgeries were included in the study. We evaluated changes in blood count, coagulation profile, electrocardiogram, chest X-ray, blood sugar, kidney function, sodium and potassium levels, and eventual change in clinical approach occurring due to these changes.

Results: Of 800 patients evaluated, a blood count was performed in 97.5%, coagulation in 89%, electrocardiogram in 74.1%, chest X-ray in 62%, fasting glucose in 68%, serum urea and creatinine in 55.7%, and plasma levels of sodium and potassium in 10.1%. Of these 700 patients, 68 (9.71%) showed changes in preoperative routine tests and only 10 (14.7%) of the patients with abnormal tests had a preoperative modified approach (i.e., new tests ordered, referral to a specialist or surgery postponement). No surgery was suspended.

Conclusion: We found that preoperative additional tests are excessively ordered, even for young patients with low surgical risk, with little or no interference in perioperative management. Laboratory tests, besides generating high and unnecessary costs, are not good standardized screening instruments for diseases.

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Introduction

Preoperative evaluation is aimed at reducing morbidity associated with surgical-anesthetic procedures and, preferably, should be performed by the anesthesiologist¹. When the anesthesiologist takes responsibility for preoperative tests, he can get a more appropriate clinical profile and consequently reduce surgery cancellations due to inadequate laboratory evaluation²⁻³. Another aspect to consider is the reduction of hospital costs when tests are made wisely. During pre-anesthetic evaluation in most patients admitted for elective surgeries, complementary tests are routinely ordered⁴ with the purpose of identifying or diagnosing diseases and disorders that may compromise the perioperative period, functional evaluation of previously diagnosed and under treatment diseases, and also help in the formulation of specific or alternative approaches for anesthetic care⁵. Routine tests are defined as compulsory tests for all patients regardless of the findings obtained from clinical evaluation^{4,6}. In this list, there are serum and urine biochemical changes, blood count and coagulation studies, X-ray and electrocardiogram examinations, among others⁴. However, literature data indicate that these tests are not cost-effective and neither related to any perioperative complications⁴. Published studies show no laboratory test benefit when used as the sole means of preanesthetic evaluation⁶. History and physical examination are considered the most effective methods of diagnosing disease^{6,7}. There is also the possibility of tests not based on clinical history leading to increased risk for the patient, especially when false-positive results motivate further research, sometimes invasive, and leading to the unnecessary postponement of surgery, prolonging hospital stay and subjecting the patient to the risk of hospital infections. It is estimated that of the US\$30 billion spent in the U.S. on laboratory tests, at least 10% are intended for preoperative assessments. When taking into consideration the history and physical examination as determinants of preoperative tests, about 60-70% of laboratory tests would be unnecessary⁵. Vogt and Henson conducted a retrospective review of medical records and estimated hospital savings to be approximately US\$80,000 annually just by eliminating preoperative testing not indicated for the 5,100 patients studied². Tests may be beneficial for patients who require postoperative care in the intensive care unit, as well as providing baseline values for later comparisons⁸. However, considering the lack of benefits

Table 1 Size of Surgical Procedure.

Size	Surgery type
Medium	<ul style="list-style-type: none"> • Intraperitoneal and intrathoracic • Carotid endarterectomy • ENT-laryngeal and head and neck • Orthopedic • Neurological • Urogynecological
Minor	<ul style="list-style-type: none"> • Endoscopic procedures • Eye surgery • Breast surgery • Superficial procedures

and high costs, routine testing is expendable, especially in institutions in which surgical procedure must absorb the costs of laboratory tests⁸. Pzankie et al. proved that even in the elderly, routine laboratory tests were not better predictors of perioperative morbidity than ASA physical status classification and surgical risk (according to the cardiac risk criteria of the ACC/AHA)⁸. According to Miguel Garcia et al.⁹, education and training of doctors should be more scientifically sound, emphasizing the importance of effective and cost-effective clinical decisions. The financial aspects and benefits of objective tests, as opposed to extensive preoperative screening, have been thoroughly reviewed in the literature⁸. Current trends point to performing preoperative tests based on clinical assessment and careful physical examination, which, no doubt, are the bases of preanesthetic evaluation⁴.

The aim of this study was to evaluate the benefit of routine preoperative tests performed during preanesthetic evaluation of low-risk patients undergoing minor and medium elective surgeries.

Method

Prospective, cross-sectional, clinical study of a survey conducted at the preanesthetic department of Hospital Santo Antônio, Salvador, BA.

The study included 800 (eight hundred) patients of both genders, aged between 1-45 years, classified as ASA I, undergoing minor-medium elective surgeries (Table 1) at the operating theatre of Hospital Santo Antônio.

Table 2 Number and Percentage of Tests Performed and Change in Clinical Approach.

Tests	Number of tests (%)	Abnormal tests (%)	Change in approach (%)
Blood count	781 (97.62)	13 (1.66)	1 (0.13)
Coagulation	709 (88.62)	11 (1.55)	8 (1.13)
ECG	583 (72.87)	40 (6.86)	3 (0.51)
Chest X-ray	496 (62)	6 (1.21)	0
Glucose	548 (68.5)	10 (1.82)	2 (0.36)
BUN /Cr	441 (55.12)	0	0
Na/K	88 (11)	2 (2.27)	0
Total	3,646	82 (2.25)	14 (0.38)

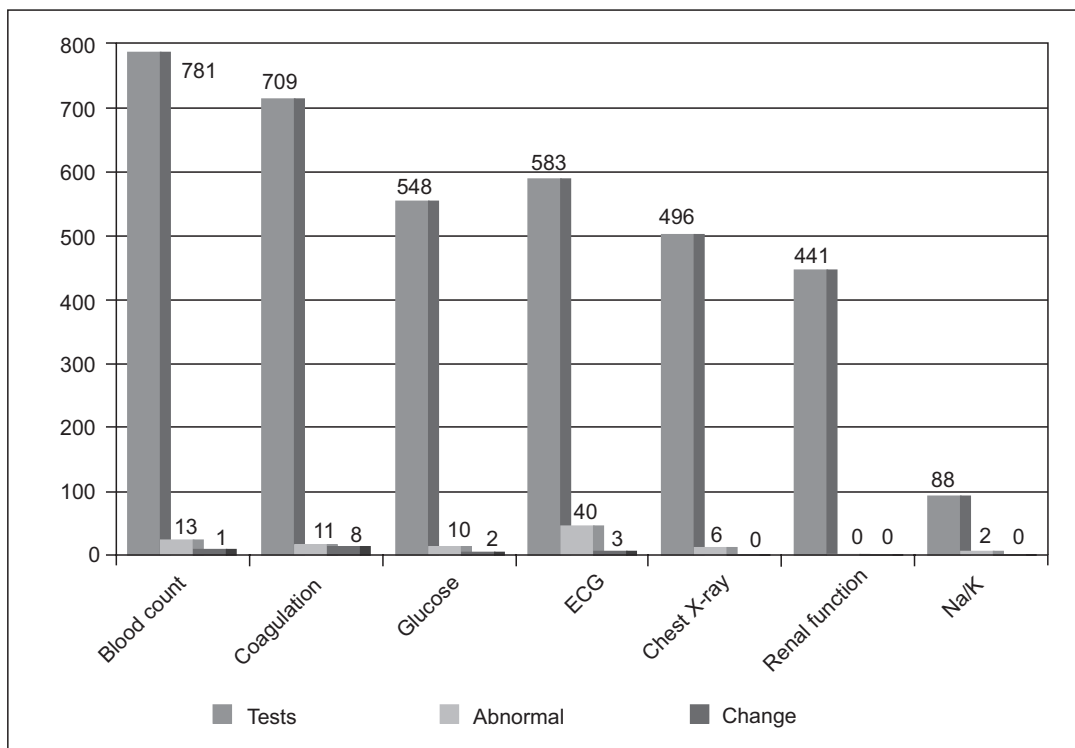


Figure 1 Comparison of Results.

Patients were attended at the preanesthetic evaluation department in the period between March and December 2009. A paper form was filled with data from laboratory tests, abnormalities in these tests, and change in approach. Change in approach was defined as new tests ordered, referral to a specialist and/or postponement of surgery. The surgeon previously ordered preoperative additional tests, according to his routine, without interference from the anesthesiologist. The results were assessed using descriptive statistics.

Results

Of the 800 patients studied, 453 (56.62%) were female and 347 (43.4%) were male. We performed 3646 preoperative tests, including complete blood count, coagulation profile, fasting glucose, urea, creatinine, sodium, potassium, electrocardiogram and chest X-ray. Of these 3646 tests, only 82 (2.25%) showed change in results, and only 14 (0.38%) required a change in approach.

Discussion

The American College of Physicians recommends that laboratory tests be ordered with selective and restrictive criteria, always supported by clinical justification. Finding changes in tests of clinically healthy patients usually does not influence their treatment⁶, and commonly does not alter the planning and management during the perioperative period^{1,4,6}. Furthermore, there is little evidence that any abnormalities found in tests compulsorily performed are associated with increased surgical morbidity. Evidence suggests that 60-70% of preoperative tests would be unnecessary if a careful clinical

evaluation was performed⁵⁻¹⁴. However, routine preoperative tests increase hospital costs and provide no protection regarding legal medicine, becoming, in this sense, an eventual extra risk for medical staff when unnecessary tests result in requests for other diagnostic procedures, which may entail risks and complications for patients^{4,10}. In contrast, in more than half of cases, doctors seem to ignore abnormal laboratory results, which can be more serious in terms of legal liability than not ordering the test⁶. The factors influencing the indiscriminate ordering of preoperative tests are not well known. Some of the assumptions are insecurity during clinical evaluation, distrust of doctors in their work and literature, confidence in the fact that a larger number of exams mean more security, belief that they will have legal protection, and fear that these patients have their anesthesia postponed for lack of preoperative tests⁴.

Considering tests that are independent of each other, the greater the number of tests ordered, the greater the possibility of obtaining an abnormal result in a healthy patient^{4,13}. When a preoperative test shows normal results or any abnormality with no particular clinical implication, virtually no action will be taken, and it will become a test without any utility or benefit. Currently, almost all anesthetic drugs and techniques can be handled safely for kidney and cardiovascular systems⁴. Thus, if preoperative tests are ordered with the purpose of contraindicating drugs and anesthetic techniques that could cause damage to these organs, the ordering lost its meaning⁴. Literature reports that the possibility of finding abnormal hematocrit and hemoglobin values during preoperative evaluation is very uneven, and there is no concrete evidence to confirm the hypothesis that these abnormal values increase the morbidity of these

patients⁴. Likewise, renal function quantified by serum urea and creatinine during preanesthetic evaluation shows very different values, motivating no changes in anesthetic planning and perioperative period^{1,4,6,12}.

Recent guideline from the American College of Cardiology/American Heart Association advises that routine preoperative electrocardiogram (ECG) in asymptomatic patients undergoing low-risk operation is not useful and, in some cases, may even be harmful^{1,14}. Recently, Correll et al.¹⁵ published an article investigating the value of preoperative ECG and found that ECG adds no benefit in predicting postoperative cardiovascular complications, compared to the main features of medical history. The practice of indiscriminate test ordering is a problem that affects more than 30 million procedures, with a conservatively estimated direct cost above US\$18 million¹⁴.

According to a systematic review by Joo et al.¹⁶, the authors concluded that the number of abnormalities observed on chest X-ray increase with age and risk factors, and that most of these changes did not alter the perioperative period or affect postoperative evolution⁵.

At Hospital Santo Antônio (OSID), most surgical clinics routinely perform hematocrit, hemoglobin, coagulation, electrocardiogram, chest X-ray, blood glucose, urea/creatinine, and sodium/potassium tests during the preoperative evaluation of most patients, regardless of physical status.

In this study, the assistant physician ordered a total of 3,646 tests from the 800 patients admitted to the anesthesia department, of which 82 were altered (2.25%), with change in approach only in 14 (0.38%). A blood count was performed in 97.62% of patients, with only 1.66% showing alterations and 0.13% requiring change in approach. Coagulation studies were ordered in 88.62% of patients, with abnormal results in 1.55% and change in approach in 1.13%. Electrocardiograms were ordered in 583 patients, with 6.86% showing alterations and only 0.51% requiring change in approach. Chest radiographs were ordered in 496 patients, with 1.21% showing alterations and none requiring change in approach. Of a total of 548 blood glucose tests ordered, only 1.82% showed abnormal results and 0.36% required change in approach. Of the 441 urea and creatinine tests, there was no change in results or approach. Of the 88 sodium and potassium tests, only 2.25% were altered and 0.38% required change in approach.

According to the Practice Advisory for Preanesthesia Evaluation - ASA Task Force, routine ECG results were documented as abnormal in 7-42.7% of cases and required change in clinical approach in 9.1% of cases. Regarding routine X-ray, results were abnormal in 2.5-60.1% of cases and change in clinical approach in 0-51%. Routine hemoglobin abnormal findings represented 0.5-43.8% of cases and requirement for change in approach represented 0-28.6%. Routine hematocrit was abnormal in 0.2-38.9% of cases and change in clinical approach in 0-100% of cases. Routine coagulation tests showing abnormalities in BT, PT, aPTT or platelet count represented 0.8-22% of cases and required change in approach in 1.1-4% of cases. Preoperative routine potassium dosages showed 1.5-12.8% of abnormal results⁹.

In preoperative routine glucose measurement in non-diabetic patients or patients with no altered glucose metabolism, abnormal glucose levels were found in 5.4-13.8% of cases. ASA Task Force agrees that preoperative tests should

not be ordered routinely. In preoperative cases, it should be ordered in a selective manner with the purpose of guiding or optimizing perioperative management. The indications for such tests must be documented and based on information obtained from the results and scheduled surgical procedure complexity⁹. Unnecessary tests may cause injury to patients due to overtreatment of a false-positive or borderline result, and increase costs without reducing perioperative complications^{12,13}. Reducing the number of laboratory tests results thereby decreasing operating costs, time, and medical stress associated with false positive results¹².

Several studies have attempted to define the cost of unnecessary tests before elective surgery. Previous study designs have included comparison of tests ordered by surgeons with those ordered by the anesthesiologist. Em Fleicher¹⁷, Starsnic et al.¹⁸ of Thomas Jefferson University, Philadelphia, Pennsylvania, compared the group with tests ordered by the surgeon and complemented by the anesthesiologist and vice versa, deemed necessary for two consecutive periods of time in 1992. These investigators reported an average cost saving of US\$ 20.89 per patient when the anesthesiologist was the first physician determining the tests. However, there was no cancellation or changes recorded for intraoperative management attributable to inadequate testing¹⁷.

According to recent studies, the practice of anesthesiologists assessing patients and ordering tests showed a potential cost reduction of billions of dollars in preoperative testing without negatively affecting patient care^{17,19}.

Therefore, we conclude that preoperative tests should not be ordered routinely and indiscriminately, but with the purpose to guide and optimize perioperative care based on clinical history, physical examination, and size of the surgical procedure. Thus, the selective ordering of these tests is a more rational conduct.

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