

REGULATIONS FOR PERFORMING ROUTINE EXAMS TO PERFORM ELECTIVE SURGERY

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Abstract: Introduction: Elective surgeries are surgeries performed with previous appointments, that is, a surgery which is scheduled. Thus, the request for exams takes into consideration, the patient's health status at that moment, the risks that the procedure may entail. **Objective:** To present, describe and demonstrate which are the main routine exams requested for elective surgeries and the relevance of the exams of routines in elective surgeries. **Methodology:** This is an integrative literature review of an analytical and described character, through data collected in the databases "Scientific Electronic Library Online" (SciELO), the service of the "US National Library of Medicine" (PubMed) (NLM) and "Google Scholar". It was done through the search for descriptors such as: "routine exams", "routine exams for elective surgeries" and "exams requested in elective surgeries" between the years 2016 to 2021. Thus, 11 articles were assigned by eligibility. **Results:** Of the studies, 3 articles (27.27%) were obtained through Google Scholar; 5 articles (45.45%) by the "PubMed" platform and, finally, 3 articles (27.27%) by "SciELO". **Discussion:** The evaluation of preoperative laboratory tests is considered a very controversial topic. Since the tests that can or must be ordered before surgery must be based on the clinical evaluation of the patient, considering the anamnesis and physical examination. **Conclusion:** In short, the preoperative evaluation is of great relevance for the patient and for the physician, and this is how they will analyze the conditions of the patient to be submitted to a proposed surgery and establish possible operative and postoperative risks.

Keywords: Elective surgery, Exams, Preoperative.

INTRODUCTION

Elective surgeries are surgeries performed with prior appointments, that is, a surgery which is scheduled, in which the doctor, together with the patient, schedules a day and time for its performance, according to the availability of the surgeon in the hospital in question and the most favorable occasion for the procedure to be carried out, that is, a non-urgent procedure. It is known that to perform surgeries, there is a need to perform tests that are done to ensure the best health condition throughout the surgical procedure.

The evaluation performed before surgery, preoperatively, aims to improve the patient's condition due to the surgery, reducing risks, morbidity and perioperative mortality. Thus, the evaluation encompasses anamnesis, physical examination and, depending on the demand of the case, complementary exams, which will be based on the anamnesis and the initial interview. Therefore, these are the main steps of the preoperative evaluation (BATISTA, et al. 2017; FERREIRA, et al. 2020).

The request for exams takes into consideration, the patient's health status at that moment, the risks that the procedure may entail. Thus, it is essential to monitor clinical conditions and vital signs during surgery. This way, the patient must be kept stable, so that with the course of the procedure, he evolves to a good prognosis at the end of the procedure.

Currently, clinical practice is highly questioned in view of the routine request for preoperative tests, especially by patients who are asymptomatic and absent from acute and chronic pathologies or who have not had recent complications. This way, they lead to several patients who fit in as healthy the imperative: if there is really a need for the numerous tests that are requested. Thus, leading doctors and health professionals, numerous questions.

Routine exams are defined as those requested for an asymptomatic patient who is apparently healthy, without a specific clinical indication, aiming to identify conditions that were not detected before by the patient's history or by the physical examination during the anamnesis (DE ALMEIDA, 2020).

The recommendations are for laboratory tests to be indicated and requested according to the patient's anamnesis and clinical evaluation. Thus, specific indications must be individualized in order to meet the demands of the patient. In addition, it is important that the evaluation of tests that have already been performed previously occurs, thus eliminating the need for additional preoperative tests, unless the patient's clinical status has changed significantly or is not recent tests (BATISTA, et al. 2017); FERREIRA, et al. 2020; SILVA, et al. 2017).

OBJECTIVE

The objective of this research is to present, describe and demonstrate which are the main routine exams requested for elective surgeries and the relevance of routine exams in elective surgeries. Thus, the study is justified by having a unified study that presents the published information on the subject.

METHODOLOGY

This is an integrative review of the literature of an analytical and described character that was developed based on studies, research and theories already published that addressed the topic "Routine exams for elective surgery". Thus, the research was based on the creation of hypotheses to guide the study: What are the routine tests requested for elective surgery? The relevance of routine exams in elective surgeries?

The research used the following databases as data sources: the *Scientific Electronic*

Library Online” (SciELO), *the service of the “US National Library of Medicine” (PubMed) (NLM) and “Google Scholar”*. Data collection was carried out from the databases, which took place through the search for descriptors such as: “routine exams”, “routine exams for elective surgeries” and “exams requested in elective surgeries”. As inclusion criteria, articles that were published between 2016 and 2021, conceptual articles and original articles were established. As exclusion criteria, case reports were not assigned, articles that were not available in English and Portuguese, and that were not in full by digital means.

After the collection, 76 articles were identified. Of these, 66 were excluded for not meeting the proposed objective and for not meeting the established inclusion criteria.

Data collection took place through the analysis of the articles found and properly attributed to each study, aiming to identify the concepts and information that were necessary to compose the research.

All assigned articles addressed the proposed theme about the tests that are requested in elective surgeries, as well as presenting the relevance of the tests in the preoperative evaluation.

DISCUSSION

THE RELEVANCE OF ROUTINE EXAMS IN ELECTIVE SURGERIES:

The evaluation of preoperative laboratory tests is considered a very controversial topic. Since the tests that can or must be ordered before surgery must be based on the clinical evaluation of the patient, considering the anamnesis and physical examination. However, some tests have been used in a not very adequate way, looking for “some altered result” that could compromise the patient or the surgery, having little basis in clinical information (FERREIRA, et al. 2020; RAMOS, et al. al. 2018).

Tests	Abnormal exams (%)	Change in conduct (%)
hemoglobin	5	0,1-2,7
leukocytes	<1	*
platelets	1,1	*
bleeding time	3,8	*
TAP	15,6	*
TTPA	4,8	*
Blood glucose	5,2	*
Urea/Creatinine	2,5	*
Sodium/Potassium	1,4	*
Urine analysis	1-34,1	0,1-2,8
chest x-ray	2,5-37,0	0-2,1
ECG	4,6-31,7	0-2,2

Table 2. Abnormal preoperative tests and the influence on medical management.

Source: FERREIRA, et al. 2020.

For many patients, unassisted or lay people, believe that this “*screening*” of excess exams would be a form of protection for the patient, showing a false security. Thus, it is up to the physician, based on the needs of each patient, to request the tests that make up the ideal “*screening*” for the evaluated case and the elective procedure that will be performed.

Number of exams	False Positive Chance (%)
1	5
2	10
4	19
6	26
10	40
20	64
50	92

Table 3. Probability of false positives according to the number of tests prescribed.

Source: FERREIRA, et al. 2020.

In the preoperative evaluation of patients scheduled for elective surgical procedures, ordering laboratory tests, electrocardiogram (ECG) and chest radiography (XR) is a common practice adopted by physicians. Thus, this approach has been in place since the 1960s and was recommended for all

surgical patients, regardless of age, type or size of the procedure, even in healthy individuals with no complaints. However, this practice is associated with a high economic cost for health systems, which leads to unnecessary expenses and can delay and make the surgical procedure unfeasible (COSTA, et al. 2016; GOMES, et al. 2018; FERREIA, et al. 2018; FERREIA, et al. 2020).

Even for other types of surgical procedures and for patients with other risk profiles, there is no indication for routine preoperative examinations in asymptomatic patients. The abnormal findings found in routine examinations are relatively frequent, but they hardly lead to changes in the surgical procedure or to the suspension of the operation. Therefore, the indication of preoperative tests must always be individualized, according to the morbidities and comorbidities presented by the patient and the type/size of the proposed surgery (BATISTA, et al. 2017; FERREIRA, et al. 2020; RAMOS, et al. 2018).

The request for “preoperative screening”, unfortunately, is a routine habit of medical practice, which ends up generating insecurity in patients when it is not done, who end up questioning professionals about the need for exams. However, when the anamnesis and physical examination are well performed, the number of requests for preoperative tests drops dramatically, showing that these tests are often dispensable because, in addition to not predicting the perioperative course, they can cause a series of disorders.

Next, we will analyze the main complementary exams that are most requested, which are often considered as “routine” by many doctors.

PREOPERATIVE EVALUATION

The preoperative evaluation begins with anamnesis and a careful and guided physical

examination, evaluating the following data: history of the current disease and its treatment; exercise tolerance; the last visit to the clinic; medications in use and history of allergy; social history (including illicit drugs, alcohol and tobacco – use and cessation); any chronic disease condition, particularly cardiovascular, pulmonary, hepatic, renal, endocrine and neurological aspects; anesthetic and surgical history (importing: complications, pain, nausea and vomiting, bleeding, transfusion, fever, adverse reactions, length of stay, intensive care); bleeding and healing; the airway – Intubation conditions; Family anesthetic history – complications; venous access, pulses, puncture site; and laboratory tests and the need for consultation.

ROUTINE EXAMS REQUESTED FOR ELECTIVE SURGERY:

BLOOD COUNT

The request for a blood count occurs when the patient in question is going to undergo some medium or large procedure, or when there is an important risk factor related to hemorrhage. Therefore, the importance of a well performed anamnesis, to also evaluate the history of prominent bleeding or diseases that facilitate them.

Something interesting to be evaluated is the preoperative levels of hemoglobin, which are predictors of the need for red blood cell transfusion in patients who will undergo major surgery or at high risk of bleeding. Thus, preoperative hemoglobin levels greater than 8g/dL are considered acceptable for most patients. Thus, patients who will undergo minor surgeries do not need to measure hemoglobin, unless symptoms or signs such as fatigue, cutaneous mucosal pallor, tachycardia, history of renal failure or neoplasms suggest the presence of significant anemia (DE ALMEIDA, et al. 2020; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

A G E		Blood count	Electrolyte	Ur/Cr	Gli/ HbA1c	TAP/ TTPa	ECG	TCPP
	0-50 years old							
	50 to 60 years							
	> 60 years							
I L L N E S S E S	HAS							
	Cardiac							
	Pulmonary							
	Myeloproliferative							
	Liver							
	Renal							
	Hemorrhagic							
	Diabetes							
M E D I C A T I O N S	Diuretics							
	Corticosteroids							
	Anticoagulants							
	Myelotoxic							
P O S T A G E	Small							
	Medium							
	Great							

 do not request
  request

U/Cr- ureia/creatinina; Gli/HbA1c- glicemia/Hemoglobina glicada; TAP/TTPa- tempo de protrombina e tempo de tromboplastina ativada; ECG- eletrocardiograma em repouso; TCPP- telerradiografia dos campos pleuropulmonares.

Figure 4. Factors and tests to be ordered.

Source: SANTOS, IGLESIAS, 2017.

Regarding the WBC evaluation, it is not recommended as a routine exam for patients who do not present symptoms of inflammation, however, it is only requested in cases of patients with symptoms or signs of infection, patients at high risk of drug-induced leukopenia or disease. myeloproliferative. Entertaining, it is part of the blood count and becomes timely in the evaluation of possible infections. (DE ALMEIDA, et al. 2020; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

The platelet count also does not fit into routine preoperative exams, and is not indicated, with the exception of patients who have a history or physical exams compatible

with thrombocytosis or thrombocytopenia (abnormal bleeding, hematological diseases, splenopathies, liver diseases, use of drugs that cause thrombocytopenia, among others). However, if the patient has a history of thrombophilia, it must be investigated to mitigate the surgical risks (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

The recommendation for the use of a blood count (red blood cell, leukocyte and platelet count) and routine hemostasis tests (PT and APTT) for elective surgeries is summarized in images 1 and 2, respectively.

Do not	Healthy patients, under 60 years of age, in minor surgeries, lower risk (69) (B) Healthy patients over 60 years of age Patients with cardiovascular and respiratory comorbidities, in minor surgeries. In neurosurgeries.
Consider it 71 (B) Yes	Adult patients with renal comorbidity and with any comorbidity in medium and large surgeries are at greater risk. in cardiovascular surgery.

Figure 5. Recommendations for ordering a blood count.

Source: MUNRO, J.; BOOT, A.; NICHOLL J. Routine preoperative testing: a systematic review of the evidence. Health Technology Assessment. 1:1-62. 1997.

Do not consider it	healthy patients
Yes	Patients with renal comorbidity in surgeries of any size In cardiovascular surgery. in neurosurgery.

Figure 6. Indication for TP and TTPA request.

Source: MUNRO, J.; BOOT, A.; NICHOLL J. Routine preoperative testing: a systematic review of the evidence. Health Technology Assessment. 1:1-62. 1997.

COAGULATION TEST

The coagulation test, known as coagulogram, is a very important test when it comes to preoperative prescription, as it also serves to mitigate legal problems in perioperative hemorrhagic or thrombotic complications. (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017).

In patients who are known to have coagulopathies or who are using anticoagulants, performing prothrombin time/activity (TAP) and activated partial thromboplastin time (APTT) is essential for surgical planning. Thus, TAP and PTT are not able to predict bleeding or thrombosis in the trans or postoperative period in patients without the above characteristics, and small changes do not usually change medical

management (GAMERMANN, STEFANI, FELIX, 2017). Therefore, they must be requested in cases where the patient is on anticoagulation therapy with warfarin: due to liver failure; or patients with coagulation disorders, entering, in these situations, patients have a history of bleeding or medium to large interventions).

To assess the risk of bleeding, bleeding time is no longer an adequate and assertive test, and is no longer indicated for preoperative assessment.

LIVER TESTS

Liver exams, which seek to assess liver function, are recommended as part of the preoperative evaluation, minus the serum albumin dosage, since it may be indicated

Minimum	Low	High
Simpler dental procedures (for example: extraction of up to 3 teeth)	Endoscopy with biopsy	The rest (abdominal, orthopedic, thoracic surgery, kidney or liver biopsy)
Cataract	Prostate or bladder biopsy	
Glaucoma	electrophysiological study	
endoscopy without biopsy	implant of pacemaker or ICD	
Superficial surgeries		

Figure 7. Risk of Bleeding in Elective Surgery.

Source: <https://cardiopapers.com.br/novos-anticoagulantes-cirurgia-eletiva-when-suspensao-a-medicacao/>

in cases of patients compatible with liver disease, severe malnutrition or neoplasia and who will undergo major surgery. However, its markers are necessary when seeking a broader assessment (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

BLOOD GLUCOSE

Serum glucose measurement is not recommended as a routine preoperative test in asymptomatic patients. Thus, the assessment of blood glucose must be considered in patients with risk factors for diabetes mellitus, for example patients with obesity, with morbidities or who already have diagnosed diabetes. It is worth mentioning that the presence of diabetes mellitus worsens the prognosis in case of cardiac or vascular surgeries.

ELECTROLYTES

The blood dosage of electrolytes, primarily potassium, initially seeks to detect changes

that may compete with kidney disorders and cardiac arrhythmias and compromise the patient during or after surgery. It is not indicated as a preoperative routine, except in patients with renal insufficiency, cardiac insufficiency or arrhythmia, in use of drugs that alter kalaemia, such as diuretics and angiotensin-converting enzyme (ACE) inhibitors, or other drugs that may have its metabolism altered by fluctuations in serum potassium, such as digoxin (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

SERUM CREATININE (KIDNEY FUNCTION)

The serum dosage of creatinine or urea seeks to assess the patient's renal function. Thus, it is recommended in patients, symptomatic or not, with risk factors for renal failure: ≥ 50 years of age, diabetes mellitus, systemic arterial hypertension (SAH), heart disease, use of medications that influence renal function, such as anti- or ACE inhibitors,

or major surgery, with risk of hypotension and renal hypoperfusion (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017; RAMOS, et al. 2018; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

The measurement of serum creatinine seeks to assess the renal function of our patient in the preoperative period in the following circumstances: presence of nephropathy; diabetes mellitus; SAH; liver or heart failure; absence of a creatinine test in the last 12 months; medium to large interventions and patients over 40 years old enter with a lower grade of recommendation once again. Therefore, when seeking a comprehensive assessment, a request is necessary (DE ALMEIDA, et al. 2020; GAMERMANN, STEFANI, FELIX, 2017; RAMOS, et al. 2018; ROSENFELD, et al. 2019).

EXAMINATION OF URINE OR SIMPLE URINE

It is recommended in patients in situations where they present symptoms, to analyze suspicion of lower urinary tract infection and upper urinary tract infection, since such an exam has a low predictive value and may present changes without clinical symptoms.

ELECTROCARDIOGRAM (ECG)

The ECG aims to complement the general clinical evaluation of the patient, it seeks to analyze in a more specific way any possible surgical risk due to “cardiac problems”, that is, arrhythmias, ischemia, myocardial infarction, electrical conduction disorder, cavity overload or secondary change. Thus, in patients who already report an increased cardiovascular risk in the initial consultation, it is extremely important that an electrocardiographic tracing be performed in order to have a more accurate assessment of the patient’s cardiovascular health (BATISTA, et al. 2017; FERREIRA, et al. 2020).

The request for an ECG for healthy surgical patients does not have a consensus in the medical profession, as it is an exam with high rates of changes without practical significance, which add more concerns and unnecessary expenses for patients and health services.

In the literature, there is no consensus on significant electrocardiographic changes, which justify a more detailed investigation for a preoperative assessment. Thus, like the other tests that are requested, the ECG request must be based on information on the type of surgery and the patient’s history.

CHEST X-RAY

Studies demonstrate that the examination is an extension of a general physical examination and, as such, must be routinely included in a preoperative evaluation. However, it has been shown that there is insufficient diagnostic yield to justify the use of chest radiography not indicated as part of a routine physical examination. Therefore, especially in a healthy population, screening chest radiographs are very cost-effective.

It is worth mentioning that chest X-ray is not routinely indicated for asymptomatic patients, being indicated according to the initial assessment of the patient through physical examination and clinical reports. Therefore, it must be requested to confirm clinical suspicions. However, many professionals do not follow this guideline, prescribing without necessary basic criteria.

For example, a recommendation to prescribe a chest X-ray as a preoperative exam in patients who present: age > 50 years; previous diagnosis of heart or lung disease; history or physical examination suggesting heart or lung disease BATISTA, et al. 2017; FERREIRA, et al. 2020).

CARDIOLOGICAL RISK

Revised Cardiac Risk Index (RCRI),

Recommendation	Degree of recommendation	Level of evidence
History and/or abnormality on physical examination of cardiovascular disease	I	C
Patients undergoing intracavitary operations, solid organ transplantation, major orthopedic and arterial vascular surgeries.	I	C
High risk of events estimated by preoperative risk algorithms	I	B
Presence of diabetes mellitus	I	C
Obese	Ila	C
Age over 40 years	Ila	C

Figure 8-. Recommendations for Requesting an Electrocardiogram.

Source: FERREIRA, et al. 2020.

Recommendation	Degree of recommendation	Level of evidence
Patients with a history or workup suggestive of cardiorespiratory diseases	I	C
Patients over 40 years of age	Ila	C
Medium to large interventions, mainly intrathoracic and intra-abdominal surgeries	Ila	C

Figure 9 - Recommendations for requesting a chest X-ray.

Source: FERREIRA, et al. 2020.

which was developed by the ACP and the multicenter study of Evaluation perioperative period (EMAPO). Thus, each index result demonstrates benefits and harms that must be taken into consideration, in the evaluation, in order to determine the conduct and predict a possible prognosis.

The *American College of Surgeons* (ACS) established an algorithm that seeks to assess global risk and not just cardiovascular events, called ACS NSQIP (*Surgical Risk Calculator*). Thus, the algorithm, in addition to demonstrating the condition of the surgery, presents 21 clinical aspects with eight different results, including: age, sex, renal function, use of steroids for chronic diseases, sepsis 48 hours before the surgical procedure, cancer, diabetes, high blood pressure, heart failure 30 days before surgery, smoking (BATISTA, et al. 2017; FERREIRA, et al. 2020).

CONCLUSION

In short, the preoperative assessment is of great relevance to the patient and the physician, and this is how they will analyze the conditions of the patient undergoing a proposed surgery and establish possible operative and postoperative risks.

It is possible to conclude that, to the detriment of anamnesis and physical examination, a “laboratory screening” has been carried out indiscriminately in the performance of its steps, for performing elective surgeries, sometimes delaying the procedure, which causes financial, physical and mental losses. for patients. Thus, in these situations, a well-done clinical examination would already be sufficient for a good conduct of ordering tests and thus provide the necessary inputs to correctly conduct the surgery. Also, it is possible to observe that the complementary exams must be requested

according to the clinical findings, serving, as its name suggests, as complements and not as definitive diagnostic markers. Thus, it is possible to conclude that after the adequate preoperative clinical evaluation, the physician must establish the necessary additional tests, respecting the needs and individualities of each patient.

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