

# Evaluation of the Relevance and the Cost of Prescribing Preoperative Paraclinical Examinations at the Sourô Sanou Teaching Hospital in Bobo Dioulasso

Guibla Ismael<sup>1</sup>, Traoré Ibrahim Alain<sup>1, \*</sup>, Ki Bertille<sup>2</sup>, Ilboudo Charles<sup>1</sup>

<sup>1</sup>Department of Anesthesia and Intensive Care Unit, Sourô-Sanou Teaching Hospital, Nazi Boni University, Bobo Dioulasso, Burkina-Faso

<sup>2</sup>Department of Anesthesia and Intensive Care Unit, Charles-De-Gaulle Teaching Hospital, Joseph Ki Zerbo University, Ouagadougou, Burkina-Faso

## Email address:

isma\_guib@yahoo.fr (G. Ismael), itraore80@gmail.com (T. I. Alain), bertilleki@yahoo.fr (Ki Bertille), charly\_ilb@yahoo.fr (I. Charles)

\*Corresponding author

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**Abstract:** The pre-anesthetic consultation is an important step before any surgical procedure. It may include paraclinical examinations in addition to the clinical examination. The objective of this study was to evaluate the relevance and the cost of prescribing preoperative checkups by Sourô Sanou Teaching Hospital (CHUSS) surgeons. It was a prospective cross-sectional study from March to August 2016. All preoperative examinations were analyzed according to the formal recommendations of experts from the French Society of Anesthesia- intensive Care Medicine. The medico-economic impact of the implementation of the recommendations was also analyzed. A total of 2603 pre-operative checkups prescribed in 400 patients were analyzed. The mean age of the patients was 28.59 years with a sex ratio of 0.83. Intermediate surgical risk (59.7%) was the most observed. The majority of patients were ASA 1 and 2 (99%). The most popular checkups were CBC (99%) followed by blood glucose (96.7%) and serum creatinine (92.7%). We found that 5.6% of the checkups were abnormal. Of the checkups prescribed, 74.6% did not comply with international recommendations. The CBC prescription had a high compliance rate (69.2%). The lowest compliance rates were: blood glucose (1.5%), renal function, and coagulation profile (17%). The cost generated by the excess prescription of preoperative examinations was estimated at 5484, 01 US dollar for all patients (13,715 US dollar/ patient on average). The preoperative checkups performed as part of a planned surgery are mostly inadequate with a real medico-economic impact.

**Keywords:** Preoperative Checkups, Cost, Relevance, Low Income Country

## 1. Introduction

The pre-anesthetic consultation is an important step to optimize the perioperative management of surgical candidates. It includes a review of the surgical file, a clinical examination and possibly paraclinical examinations. The prescription of these paraclinical examinations has been the subject of recommendations in several countries taking into account medical data and local realities [1-3]. Globally, the international literature recommends the abandonment of systematic prescription of preoperative checkups in favor of limited additional examinations, reasoned and based on clinical or anamnestic call signs to reduce the cost of surgery

[4, 5]. In Burkina Faso, there is no recommendation that prescribes preoperative examinations. Thus, we decided to evaluate the relevance of the prescription of preoperative examinations in light of the recommendations of the French Society of Anesthesia-Intensive Care Medicine (SFAR) 2012 and the possible additional cost generated by non-compliance with them.

## 2. Methodology

### 2.1. Type and Period of Study

This was a prospective cross-sectional study that took

place over six (06) months from March to August 2016.

## 2.2. Study Population

The study population included all patients who received pre-anesthetic consultations and whose pre-operative checkups had been prescribed by surgeons for scheduled surgery.

### 2.2.1. Sample Size

The sample size was estimated at 384.16 according to the formula  $n = z^2 \times p(1 - p) / m^2$  with  $n$ =sample size;  $z$ =confidence level according to the normal reduced centered law, for a 95% confidence level;  $z=1.96$ ;  $p$ =estimated proportion of the population presenting the characteristic (when unknown, we use  $p=0.5$  which corresponds to our study)  $m$ =margin of error tolerated and we chose 5%.

### 2.2.2 Inclusion and Non-inclusion Criteria

Included in the study, all patients who received pre-anesthetic consultation during the study period for a scheduled surgery and whose preoperative checkups were prescribed by the surgeons. Patients who were scheduled for neurosurgical intervention, those who did not have proof of payment for their complementary examinations and hospitalized patients were not included.

## 2.3. Study Variables

The study data were collected during the pre-anesthetic consultation, on an individual inquiry sheet completed using the pre-anesthetic consultation report where the surgical procedure, the preoperative complementary examinations prescribed to the patients, the results of these preoperative examinations and the payment receipts for these additional examinations were registered. We collected the epidemiological and clinical characteristics (age in completed years, sex, comorbidities, antecedents), the ASA score, the stratification of the surgical risk, the surgical specialty, the abnormalities found on clinical examination, the various preoperative examinations prescribed and performed and the total price of preoperative examinations. The collection was done by a 7th year medical student with the observational method by comparing each preoperative complementary

examination prescribed against the standard.

### Reference Criteria

The formal recommendations of SFAR experts published in 2012 were chosen for this evaluation of practices. An examination was defined as compliant when it was prescribed and recommended by SFAR or not prescribed and not recommended. An examination was defined as not prescribed by default when it was not prescribed and recommended by the SFAR document. An examination was defined in excess when it was prescribed and not recommended by the document.

The compliance criteria were:

- The 12-lead resting ECG was said to be compliant if it was prescribed in a patient over 60 years of age, a cardiovascular risk factor or a clinical sign;
- A radiograph of the chest was said to be compliant if it was prescribed in a patient with a clinical or anamnestic cardiopulmonary sign;
- The coagulation profile was said to be compliant if it was prescribed in a patient whose history and clinical examination suggest a hemostasis disorder and in children before the acquisition of walking;
- The complete blood count was said to be compliant if it was prescribed in patients scheduled for intermediate or major risk surgery (ACC / AHA classification);
- The blood group / Rhesus (GS / Rh) was said to be compliant if it was prescribed in patients scheduled for surgery at risk of intermediate or high transfusion or major bleeding;
- The biochemical examinations were said to be compliant if they were prescribed in a patient with a clinical sign and the existence of a personal or family history regardless of the type of surgery;
- Cytobacteriological examination of urine (ECBU) was said to be compliant if it was prescribed in patients with advanced age, diabetes, urinary symptomatology or risk of instrumental urinary tract maneuvering.

The various structures that carried out these examinations were identified and the prices of the various examinations were recorded in FCFA (1 dollar US=588 FCFA). These prices have been noted in Table 1.

**Table 1.** The prices (in dollar) of the different examinations according to the structures in which they were realized.

Laboratories exams	CHUSS		Outside CHUSS N°1	Outside CHUSS N°2	Outside CHUSS N°3	Outside CHUSS N°4	Outside CHUSS N°5
CBC	4,59	*2,3	8,08	6,80	5,95	5,95	4,25
Blood glucose	1,70	*0,85	3,40	4,25	2,55	2,55	2,55
Serum creatinine	3,40	*1,70	3,40	5,10	2,55	2,55	3,40
Serum urea	1,70	*0,85	3,40	6,80	2,55	2,55	2,55
PT	3,40	*1,70	5,95	8,50	6,80	5,10	-
aPTT	3,40	*1,70	5,10	8,50	4350	5,10	-
Gxm	1,70	*0,85	5,95	5,10	2,55	4,25	4,25
Hb electrophoresis	3,40		7,65	-	2,55	-	-
ECG	7,65		13,61	12,76	-	-	-
Fibrinogen	3,40		5,10		-	-	-
Serum electrolytes	17,86		17,01	18,71	17,01	23,81	3,40/ion

NB: \* the price of exams for a child, CHUSS: Sourô Sanou Teaching Hospital, N° 1, N° 2, N° 3, N° 4 and N° 5 are private structures, CBC=Complete Blood Count, PT=Prothrombin Time, aPTT=Activated partial thromboplastin time, Gxm=grouping and cross matching. Hb electrophoresis=Hemoglobin Electrophoresis, ECG=Electrocardiogram.

## 2.5. Data Analysis

The collected data were entered on a microcomputer using Epi data software version 3.1 and analyzed by STATA version 12. The graphics were made using the Microsoft Office Excel 2010 software.

All information was collected with respect for patient confidentiality. The informed consent of all patients was gathered.

## 3. Result

Over a period of 6 months, 654 patients consulted and 400 patients were included in the study during pre-anesthetic consultations performed in the CHUSS anesthesia-intensive care unit. The 254 patients included inpatients and those who did not have proof of payment for additional examinations. We counted for the included patients, a prescription of 2603 preoperative paraclinical examinations carried out.

### 3.1. Epidemiological and Clinical Data

The mean age of patients was 28.59 +/- 20 years, with extremes of 01 and 87 years. The sex ratio was 0.83. The distribution of patients by age group is shown in Figure 1.

The majority of patients (95.5%) had no comorbidities. The comorbidities found were: HPT in 10 patients, 3 sickle cell disease patients, 2 diabetics, 2 asthmatics and one HIV patient. A surgical history was found in 16.3% of patients. The stratification of the surgical risk of the patients gave: low 37.5%, intermediate 59.7% and high 2.8%. These included surgery: 30% gynecologic, 22.7% digestive, 15.5% trauma

orthopedic, 11.5% urological, 10.8% maxillofacial, 9.5% otolaryngology and ophthalmology. ASA classes 1 and 2 accounted for 99% of the sample. The abnormalities found at the clinical examination and which required additional examinations concerned 4.3% of the patients. They consisted of 88.2% anemia, pneumonia and cardiopathy in one case for each of them. 86.2% of the pre-anesthetic consultations were performed by anesthetists-intensive care doctors and the rest by residents in anesthesia-intensive care.

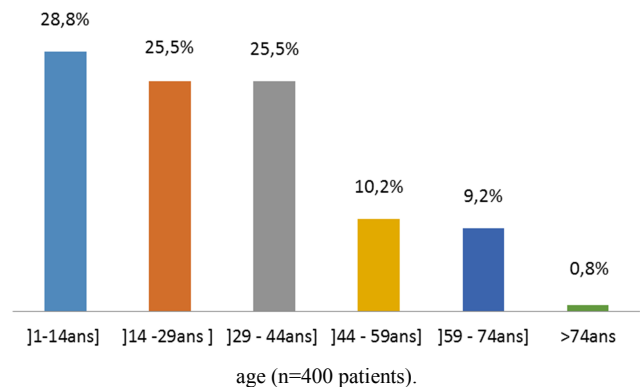


Figure 1. Distribution of patients seen in PAC by age group.

### 3.2. Compliance Rate of Prescribed Preoperative Examinations

Comparing the 2603 preoperative exams prescribed and carried out to the chosen reference system, we note that 74.6% of the examinations were not in conformity.

Table 2. Distribution of Complementary Preoperative Examinations by Compliance.

Preoperative examinations	Prescribed examinations	Compliant examinations	Compliance rate (%)
CBC	396	274	69,2
Gxm	346	157	45,4
aPTT	363	65	17,9
PT	366	63	17,2
Serum creatinine	371	41	11
Serum urea	342	36	10,5
Blood glucose	387	6	1,5
Fibrinogen	10	0	0
HIV serology	5	5	100
CRP	3	3	100
Hb electrophoresis	5	3	60
Echocardiography	1	1	100
ECG	7	7	100
Chest x ray	1	1	100
Total	2603	662	25,4

CBC=Complete Blood Count, aPTT=Activated partial thromboplastin time, PT=Prothrombin Time, Gxm=grouping and cross matching, ECG=Electrocardiogram, Hb electrophoresis=Hemoglobin Electrophoresis, CRP=C reactive protein.

Table 3. Distribution of preoperative complementary examinations according to the abnormality.

Preoperative examinations	Prescribed examinations	Compliant examinations	Compliance rate (%)
CBC	396	60	15,1
Blood glucose	387	11	2,8
Serum creatinine	371	23	6,2
aPTT	363	21	5,8
PT	366	11	3

Preoperative examinations	Prescribed examinations	Compliant examinations	Compliance rate (%)
Gxm	346	0	0
Serum urea	342	10	2,9
Fibrinogen	10	1	10
ECG	7	5	71,4
HIV serology	5	0	0
Hb electrophoresis	5	2	40
CRP	3	1	33,3
Chest x ray	1	1	100
Echocardiography	1	1	100
Total	2603	147	5,6

CBC=Complete Blood Count, aPTT=Activated partial thromboplastin time, PT=Prothrombin Time, Gxm=grouping and cross matching, ECG=Electrocardiogram, Hb electrophoresis=Hemoglobin Electrophoresis, CRP=C reactive protein.

### 3.3. Economic Aspect

The total cost of the preoperative examinations was 8154,61 dollar US, which is an average cost per patient of 20,39 US dollar with extremes of 2 US dollar and 103,23 US dollar. The total cost of the excess prescription in preoperative examinations was 5484,01 US dollar with an average additional cost per patient of 13,715 US dollar.

## 4. Discussion

Almost all patients were under 60 years of age and less than 5% had clinical abnormalities that required further investigation. Thus, they were almost all classified as ASA I and II for surgeries, mostly low and intermediate risk. According to evidence-based medicine, the majority of these patients should not have paraclinical examinations [6, 7]. However, the stratification of the surgical risk can not be the same everywhere. It must take into account local specificities including surgical techniques used and local history [8]. The global non-compliance of medical prescriptions is a worldwide reality both in anesthesia-intensive care and in other disciplines [4, 8-10]. In terms of preoperative assessment, some authors found that compliance was less poor when prescribed by anesthesiologists than by surgeons [11, 12]. Indeed, recommendations on the prescriptions of the preoperative assessment are elaborated by the learned societies of anesthesiology. However, in practice this report is prescribed in hospitals in Burkina by surgeons. Moreover, there are no national or local recommendations. The recommendations seem to be an indispensable first step in improving practices in light of "Evidence Based Medicine" although often contested and even diverted from its purpose [13]. The partial analysis of the results of the study notes that the CBC is the most prescribed examination with a high compliance, similar to that of Bernard and Gokulan's teams in France [4, 8]. The high prevalence of preoperative anemia (30% in Europe and the US) and its impact on morbidity and mortality make that the complete blood count is indicated for all non-minor surgery to detect and treat anemia before scheduled surgery [14]. -16]. For example, a sub-Saharan study reported an incidence rate of surgical site infection multiplied by three in the presence of anemia [17]. As for the assessment of hemostasis testing, it has been

clearly established that a negative clinical investigation renders it useless [18-20]. This is also valid in pediatrics (after the age of walking) and in obstetrics [21, 22]. However, its prescription remains almost systematic in this study and in those carried out in developed countries [8, 23]. Contrary to what one might think, this attitude has no medico-legal value and would not protect in case of an intraoperative hemorrhagic incident. With regard to kidney function test and blood glucose, their compliance rates are increasing in hospitals with a prescription guide and a regular evaluation of practices while it remains systematic in our hospitals. They should be prescribed to patients with known risk factors [24, 25]. These unreasoned, systematic prescriptions are harmful for patients in a context of poverty, difficulty of access to paraclinical examinations and surgery. Indeed, the economic impact is enormous with an additional cost of 13,715 us dollar per patient. Losing such a sum of money to a patient in one of the poorest countries in the world is a tragedy. As a result, national learned anesthesia and surgical societies must consensually formulate simple, short and context-specific recommendations and then regularly evaluate professional practices to provide quality care at a lower cost.

## 5. Conclusion

This study revealed a non-rational prescription of most preoperative paraclinical examinations. One of the consequences of this systematic prescription is the increase in health care costs for patients who mostly have modest or low financial incomes. It is therefore essential to train prescribers on the rules governing the prescription of these examinations. The drafting of consensual protocols between surgeons and anesthesiologists adapted to our work context would contribute to rationalize the prescriptions of these complementary examinations.

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