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Frequency and Factors Associated with Preoperative Anxiety Specific to Anesthesia in Patients awaiting Surgery in Kinshasa

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Abstract: ***Background**: Preoperative anxiety related to anesthesia can affect patients' psychological preparation and perioperative care. Data regarding anesthesia-specific anxiety in Kinshasa remain limited. This study assessed its frequency and associated factors in adult surgical patients. **Methods**: A prospective, analytical, multicenter study was conducted in four hospitals in Kinshasa between May 2025 and August 2026. A total of 443 adult patients were consecutively recruited. Anxiety and information needs related to anesthesia were assessed using the Amsterdam Preoperative Anxiety and Information Scale (APAIS). Associated factors were analyzed using binary logistic regression. **Results**: Preoperative anxiety specific to anesthesia was identified in 212 patients (48%). A university education level was associated with an increased likelihood of anxiety (aOR = 18.5; 95% CI: 8.5 to 40.2), while prior experience with anesthesia (aOR = 0.4; 95% CI: 0.3 to 0.8) and detailed explanations received during the pre-anesthetic consultation (aOR = 0.04; 95% CI: 0.02 to 0.09) were associated with a lower likelihood. Moderate information needs were associated with an increased likelihood of anxiety (aOR = 2.14; 95% CI: 1.1 to 4.2). **Conclusion**: Preoperative anxiety specific to anesthesia affected nearly half of the patients studied. Educational level, anesthetic history, pre-anesthetic detailed explanations, and information needs were independently associated with anxiety. Personalized preoperative communication and a systematic assessment of information needs could improve patient preparation for anesthesia.*

Keywords: Preoperative anxiety; Anesthesia; Amsterdam Preoperative Anxiety and Information Scale; Pre-anesthetic consultation; Patient education; Democratic Republic of Congo.

1. Introduction

Preoperative anxiety is a common emotional reaction in patients undergoing surgery. It is characterized by feelings of fear, worry, or apprehension related to the procedure itself, anesthesia, pain, potential complications, or uncertainty about the outcome [1,2]. Among these different dimensions, anesthesia-specific anxiety is particularly important because it can directly influence patient preparation and the course of anesthetic management.

The preoperative period is indeed a potentially stressful situation for the patient. The prospect of losing consciousness, not waking up after general anesthesia, experiencing pain during the procedure, or developing complications is a significant source of apprehension. This anxiety can lead to activation of the autonomic nervous system and manifest as tachycardia, hypertension, sweating, tachypnea, or other neurovegetative manifestations that may complicate perioperative management [3, 4, 5].

Preoperative anxiety can also influence several clinical and anesthetic parameters. High levels of anxiety have been associated in various studies with increased needs for anesthetic and analgesic medications, a greater perception of postoperative pain, the occurrence of postoperative nausea and vomiting, and decreased patient satisfaction [3, 4, 5, 6, 7]. It therefore constitutes a significant problem for the anesthesiologist, not only because of its psychological impact but also because of its potential consequences on the perioperative course.

The frequency of preoperative anxiety varies considerably depending on the populations studied, patient characteristics, the type of surgical procedure, whether the procedure is scheduled or urgent, and the instruments used for its assessment [1, 8, 9]. The anesthesia team is confronted with preoperative anxiety daily. It is estimated that 60 to 80% of adults undergoing surgery may develop anxiety. In the United States, the prevalence is estimated at 20.2%, in Europe it varies between 27 and 80%, while in Africa it is very high, with proportions ranging from 51 to 90% in Nigeria and 67.5% in Tunisia, and 51.9% in Kinshasa [2, 3, 5, 10]. Several factors have been reported as being associated with high preoperative anxiety, including young age, female sex, lack of prior anesthetic or surgical experience, level of education, type and severity of intervention, and lack of information regarding anesthesia and surgery [11, 12, 13, 14].

The pre-anesthetic consultation is an essential step in preparing the patient for surgery. Beyond the clinical assessment and identification of anesthetic risks, it represents a valuable opportunity to inform, reassure, and prepare the patient psychologically. Adapted, clear, and individualized information can help reduce uncertainty and improve understanding of the anesthesia process. However, information needs vary from patient to patient and must be addressed through an individualized approach.

Several tools can be used to assess preoperative anxiety. Among them is the **Amsterdam Preoperative Anxiety and Information Scale (APAIS).** It has the advantage of being a brief, easy-to-use questionnaire specifically designed to simultaneously assess anesthesia-related anxiety, surgical anxiety, and the patient's need for information. Its use appears particularly valuable in settings where a rapid assessment can be integrated into the pre-anesthetic consultation or the immediate preoperative period.

In African countries, several studies have reported a high frequency of preoperative anxiety [15, 11, 16]. However, data remain limited, and results vary depending on hospital and sociocultural contexts. In the Democratic Republic of Congo, and particularly in the city of Kinshasa, where a large part of the country's surgical and anesthetic activity is concentrated, data on anesthesia-specific preoperative anxiety remain insufficient, with the exception of studies by Lukeba et al. (Kinshasa 2025) and Nakwa Aimé et al. (North Kivu 2025), which used either other assessment scales or assessed overall anxiety without focusing on anesthesia-specific anxiety [10, 17].

A lack of awareness regarding the extent of this problem and its determinants can limit the implementation of appropriate screening and prevention strategies. However, identifying patients most likely to experience significant anxiety would improve preoperative communication, tailor information to patient needs, and enhance the overall quality of anesthetic care. It is with this in mind that the present study was undertaken to determine the frequency of anesthesia-specific preoperative anxiety and identify its associated factors in adult patients undergoing surgery at several hospitals in Kinshasa.

2. Methods

Period, nature and framework of the study

This was a prospective, analytical, and multicenter study on the assessment of preoperative anxiety in anesthesia at hospitals in Kinshasa. It covered the period from May 2025 to August 2026, a duration of 16 months. The study took place in several hospitals in Kinshasa, selected consecutively. These included: the University Clinics of Kinshasa, the Monkole Mother-Child Hospital, the Biamba Marie Mutombo Hospital, and HJ Hospitals. All of these selected medical facilities have an Anesthesia and Intensive Care Unit with a Post-Anesthesia Care Unit staffed permanently by at least one anesthesia resident and one specialist, and all responded favorably to the request.

The present study used prospective data collection. Sampling was consecutive with a total of 443 patients aged at least 18 years to undergo a surgical procedure under anesthesia in the operating room, classified ASA less than 4, without sensory-cognitive disorders and who had given verbal and/or written informed consent.

Study Technique and Procedure

Patients were identified before the procedure and received information about the study before obtaining informed consent. The APAIS questionnaire was administered without modification preoperatively during the pre-anesthetic visit or, for hospitalized patients, on the morning of the procedure. For outpatients, the questionnaire was administered upon arrival at the hospital when the nurse took vital signs. The interview was conducted in French, with an oral explanation in the patient's native language when necessary. Clinical information was obtained from the medical record and the anesthesia record. The initial data collection also included intraoperative and immediate postoperative information. The analysis presented here is limited to the APAIS dimensions and the factors relevant to their study preoperatively.

The Amsterdam Preoperative Anxiety and Information Scale (APAIS) (12)

Items		No way	A little	Moderately	A lot	Extremely
A	I am concerned about the anesthesia	1	2	3	4	5
B	I think about anesthesia constantly.	1	2	3	4	5
C	I would like to know as much as possible about anesthesia.	1	2	3	4	5
D	I am concerned about the intervention	1	2	3	4	5
E	I keep thinking about the intervention	1	2	3	4	5
F	I would like to know as much as possible about the procedure.	1	2	3	4	5

Anxiety regarding anesthesia or the procedure has been defined as follows:

- Anxiety related to anesthesia (APAIS-anesthesia): A + B
- Anxiety related to surgery (APAIS-surgery): D + E
- Global anxiety (APAIS-anxiety): A + B + D + E
- The overall information need (APAIS-info): C + F

Note: General anxiety is a binary variable (1 value greater than 11) and anxiety regarding anesthesia/surgery (1 value greater than 6).

The information need score was categorized into 3 classes, namely:

- Lack of or low need for information: score of 2 to 4
- Moderate desire for information: score of 5 to 7
- High desire for information: score above 7.

The dependent variable was preoperative anxiety, measured using the APAIS scale. The various independent variables were sociodemographic characteristics, including age, sex, education level, marital status, and healthcare financing. Age was expressed in years. For the models, education level was

grouped into university and non-university; the latter group included the categories "graduate" and "uneducated." Marital status was grouped into married and unmarried for association analyses. Clinical and operative characteristics included anesthetic history, explanations received at the anesthesia center, whether the procedure was urgent or elective, ASA class, surgical specialty, comorbidities, BMI, allergies, and self-reported use of psychoactive substances. BMI was calculated as weight in kilograms divided by height in meters squared. The presence of comorbidity and anesthetic history was determined from the original descriptions.

The variable “explanations received at the CPA” distinguished between yes and no responses depending on whether the information provided was in-depth or not in-depth. It described the patient's statement and did not measure, using a separate scale, the content, duration, comprehension, or quality of the information. The surgical specialty was described in its initial categories. For modeling purposes, adult orthopedics, neurosurgery, urology, and maxillofacial surgery were grouped together in the "other specialties" category due to their small patient numbers. The three other groups were general and visceral surgery, gynecology, and obstetrics.

Anesthetic information included the type of anesthesia, anesthetic risk and peri-anesthetic events including the occurrence of anesthetic incidents and complications as well as the methods of anesthetic awakening.

Data processing and analysis

The data were verified before analysis. Each APAIS response had to be an integer from 1 to 5. The four sums were recalculated from the items and compared to the initial sums. All 443 observations had valid items and concordant scores. No imputation of the APAIS items was performed. The recoded data were kept separate from the source data. The variables used in the models were complete for the analyzed sample size. The technical row identifier linked each analytical observation to its source row; it was not an institution identifier.

Statistical analyses were performed using Python 3.12. Qualitative variables were described by their frequencies and percentages. The distribution of quantitative variables was examined using the Shapiro-Wilk test; skewed variables were presented by their median and first and third quartiles. Principal proportions were accompanied by a 95% confidence interval calculated using Wilson's method.

Crude associations were analyzed using univariate logistic regressions, with calculation of odds ratios (ORs) and their 95% confidence intervals (CIs). P-values for the coefficients were obtained from the Wald test. For multi-category factors, the overall association was examined using the likelihood ratio test. Explanatory variables were selected based on their clinical relevance and expected precedence at assessment, without automatic selection based solely on p-values.

The anxiety model included age, sex, education level, anesthetic history, explanations received, urgency, ASA class, and surgical specialty. Age was maintained continuously, with an odds ratio (OR) expressed for an increase of 10 years. ASA class and comorbidities were not simultaneously included in the primary model. After the additive model failed to fit properly, an interaction between education level and explanations was examined. This analysis was exploratory. The associations of explanations were then estimated separately by education level, using contrasts from the same adjusted model.

For the high information need, the primary model included age, sex, education level, anesthetic history, explanations, and urgency. This model was limited to these factors due to the 86 events and the sparse cell count. An extended model adding ASA class and surgical specialty was investigated using sensitivity analysis. The linearity of the relationship between age and logit was examined using an age × logarithm of age term. Collinearity was assessed using the VIF (Variable Interest Factor). Goodness of fit was examined using the Hosmer–Lemeshow test with probability grouping into ten groups. The relationship between anxiety and information scores was investigated using Spearman's rank correlation coefficient; the comparison of binary indicators was supplemented by Fisher's exact test. The tests were two-sided, with a significance level of 0.05. ORs (Operational Ratios) were interpreted as odds ratios, not risk ratios. Particular attention was paid to very high or inaccurate estimates in categories with few events.

Ethical considerations

The protocol was approved by the Ethics Committee of the School of Public Health at the University of Kinshasa under number ***ESP/CE/92/2025***. Participation was based on voluntary consent after the patient had been informed. The confidentiality of the information collected was maintained during data processing and analysis. These provisions are in accordance with the principles of protecting participants in medical research.

3. Results

Frequency of preoperative anesthetic anxiety in the study population

A total of 443 patients were included in the study. Among them, 212 patients presented with preoperative anxiety specific to anesthesia, corresponding to a frequency of 48%. Thus, nearly one in two patients scheduled to undergo surgery presented a significant level of anxiety regarding anesthesia.

The elements of the APAIS score of the study population

Table 1 shows that regarding item A, relating to concerns about anesthesia, 39.5% of patients reported being "somewhat" concerned and 26.2% "moderately" concerned. Significant concern was reported by 17.2% of patients, while 9.5% reported being extremely concerned. Only 7.7% reported no concerns.

For item B, concerning thinking about anesthesia constantly, the most frequent response was "moderately" (36.3%), followed by "a little" (31.8%). Furthermore, 14% of patients thought about it "a lot" and 4.5% "extremely." Regarding item C, concerning the need for information about anesthesia, 40.2% of patients expressed this need "a little" and 25.3% "moderately." A significant need was observed in 15.3% of patients and an extremely significant need in 11.1%.

Table 1: Distribution of APAIS questionnaire items in the study population

APAIS Questionnaire	Value
(Items A, B, C, D, E)	n=443
I am concerned about the anesthesia (A)	
No way	34(7,7)
A little	175(39.5)
Moderately	116(26,2)
A lot	76(17,2)
Extremely	42(9,5)
I keep thinking about anesthesia (B)	
No way	59(13,3)
A little	141(31,8)
Moderately	161(36,3)
A lot	62(14)
Extremely	20(4.5)
I would like to know everything that is possible regarding my anesthesia (C)	
No way	36(8,1)
A little	178(40,2)
Moderately	112(25,3)
A lot	68(15,3)
Extremely	49(11,1)
I am worried about my operation (D)	
No way	42(9,5)
A little	191(43,1)
Moderately	108(24,4)
A lot	70(15,8)
Extremely	32(7,2)
I keep thinking about my operation (E)	
No way	57(12,9)
A little	233(52.6)
Moderately	80(18,1)
A lot	52(11,7)
Extremely	21(4,7)
I would like to know everything that is possible regarding my operation (F)	
No way	51(11,5)
A little	200(45.1)
Moderately	46(10,4)
A lot	81(18,3)
Extremely	65(14,7)

Regarding item D, which relates to being worried about the operation, 43.1% of patients reported being "somewhat" worried and 24.4% "moderately" worried. Significant worry was reported by 15.8% of patients and extreme worry by 7.2% (see Table 1). For item E, which relates to thinking about the operation continuously, 52.6% of patients responded "somewhat" and 18.1% "moderately." Furthermore, 11.7% thought about it "a lot" and 4.7% "extremely." Finally, regarding item F relating to the need for information on the intervention, 45.1% of patients expressed this need "a little", 10.4% "moderately", 18.3% "a lot" and 14.7% "extremely". (see table no. 1).

Association between preoperative anesthetic anxiety and epidemiological data of patients

Bivariate analysis showed a statistically significant association between age and anesthesia-specific preoperative anxiety ($p = 0.046$). Patients aged 35 years or younger had an anxiety rate of 52.3%, compared to 42.9% in patients over 35 years of age. Educational level was also significantly associated with anxiety ($p < 0.001$). The anxiety rate was 72.8% in patients with a university education versus 16.8% in those without a university education. In contrast, no statistically significant association was observed between anxiety and sex, religion, marital status, or healthcare financing method (see Table 2).

Table 2: Association between preoperative anesthetic anxiety and patient epidemiological data

Variables	All n=443	Preoperative anesthetic anxiety		P value
		No n=231	Yes n=212	
Age, years				
≤35 years old	233	111(47.6)	122(52.3)	0.046*
>35 years old	210	120(57.1)	90(42.9)	
Sex				
Female	338	170(50.3)	168(49.7)	0.162
Male	105	61(58,1))	44(41,9)	
Education level				
Non-academic	197	164(83,2)	33(16,8)	<0.001*
University	246	67(27,2)	179(72.8)	
Religion				
Believer	420	218(51.9)	202(48,1)	0.666
Not a believer	23	13(56.5)	10(43.5)	
Marital status				
Married	352	186(52.8)	166(47,2)	0.564
Unmarried	91	45(49.4)	46(50.5)	
Healthcare financing				
Mutual insurance	227	122(53.7)	105(46.2)	0.489
Private	216	109(50.5)	107(49.5)	
Body mass index				
Not obese	385	196(50.9)	189(49,1)	0.18
Obese	58	35(60.3)	23(39,7)	
Comorbidities				
Absent	361	181(50,1)	180(49.9)	0.076
Present	82	50(60.9)	32(39)	
Psychoactive substance				
No	291	152(52,2)	139(47,8)	0.959
Yes	152	79(51.9)	73(48)	
Type of surgery				
Orthopedic	13	6(46,2)	7(53,8)	
General and visceral	191	106(55.5)	85(44.5)	
Gynecological	97	33(34)	64(65,9)	0.424
Neurosurgery	9	3(33,3)	6(66,7)	
Obstetrics	130	81(62.3)	49(37.7)	
Others	3	2(66,7)	1(33,3)	
Nature of the intervention				
Scheduled	306	177(57.8)	129(42,2)	<0.001*
Urgent	137	54(39,4)	83(60,6)	

This table shows that the type of surgery was significantly associated with anesthesia-specific preoperative anxiety ($p = 0.001$). The highest rates of anxiety were observed in patients undergoing neurosurgery, gynecological surgery, or orthopedic surgery. The urgency of the procedure was also associated with anxiety ($p < 0.001$). The rate of anxiety was 60.6% in patients undergoing urgent surgery compared to 42.2% in those scheduled for elective surgery. Body mass index, comorbidities, and psychoactive substance use were not significantly associated with anesthesia-specific preoperative anxiety.

Association between preoperative anesthetic anxiety and patients' anesthetic information

This table highlights that prior experience with anesthesia was significantly associated with preoperative anxiety ($p = 0.018$). Patients who had never received anesthesia reported a 55.6%

anxiety rate, compared to 40.5% among those with prior anesthetic experience. Receiving explanations about the anesthesia procedure during the pre-anesthetic consultation was strongly associated with anxiety ($p < 0.001$). The anxiety rate was 70.5% among patients who reported receiving incomplete explanations, compared to 14.5% among those who reported receiving complete explanations. The type of anesthesia was also associated with anxiety ($p = 0.001$). Patients scheduled for general anesthesia reported a higher rate of anxiety than those scheduled for regional anesthesia. ASA class and premedication were not significantly associated with anesthesia-specific preoperative anxiety.

Table 3: Association between preoperative anesthetic anxiety and patients' anesthetic information

Variables	All n=443	Preoperative anesthetic anxiety		P value
		No n=231	Yes n=212	
Previous experience with anesthesia				
at least one experience	227	135(59.5)	92(40.5)	0.018*
No experience	216	96(44,4)	120(55.6)	
Explanations provided to the CPA				
Not detailed	264	78(29.5)	186(70.5)	<0.001*
Detailed	179	153(85.5)	26(14.5)	
ASA Class				
One and two	357	193(54,1)	164(45.9)	0.1
Three	86	38(44,2)	48(55.8)	
Premedication				
No	418	220(52.6)	198(47.4)	0.401
Yes	25	11(44)	14(56)	
Type of anesthesia				
General anesthesia	223	99(44.4)	124(55.6)	0.001*
Regional anesthesia	220	132(60)	88(40)	
Intraoperative incident				
None	378	225(59.5)	153(40.5)	<0.001*
Here	65	6(9,2)	59(90.8)	
Awakening				
Delayed	8	1(12.5)	7(87.5)	<0.001*
Fast	146	52(35.6)	94(64,4)	
Duration of anesthesia				
≤2 hours	297	159(53.5)	138(46.5)	0.403
>2 hours	146	72(49.3)	74(50.7)	
Surgery duration				
≤2 hours	318	167(52.5)	151(47.5)	0.803
>2 hours	125	64(51,2)	61(48.8)	
Postoperative complication				
No	405	220(54.3)	185(45.7)	0.003*
Yes	38	11(28,9)	27(71,1)	

Table 3 shows associations between perioperative adverse events and preoperative anxiety. These associations are only exploratory, as they occurred after preoperative anxiety assessment. Indeed, preoperative anesthetic anxiety was highly associated with the occurrence of intraoperative anesthetic incidents ($p<0.001$), patient awakening ($p<0.001$), and postoperative anesthetic complications ($p=0.003$). The high proportions of patients who experienced preoperative anxiety subsequently developed intraoperative anesthetic incidents (90.8% vs. 40.5%), delayed awakening (87.5% vs. 64.4%), and then postoperative anesthetic complications (71.1% vs. 45.7%). No association was found between preoperative anesthetic anxiety and the duration of anesthesia ($p=0.403$) or surgery ($p=0.803$). Similarly, no association was found with the qualifications of the healthcare professionals involved ($p>0.05$).

Factors associated with preoperative anesthetic anxiety in the study population

In univariate analysis, several variables were significantly associated with preoperative anesthetic anxiety: young age ($p=0.046$), university level ($p<0.001$), lack of prior anesthetic experience ($p=0.002$), the reception explanation during preoperative anesthesia ($p<0.001$), type of surgery ($p=0.006$), urgency of the intervention ($p<0.001$), general anesthesia ($p=0.001$), anxiety related to surgery and need for information ($p<0.001$).

Table 4: Factors associated with preoperative anesthetic anxiety in the study population

Determinants	Univariate analysis		Multivariate analysis	
	P	OR (95% CI)	P	ORa (95% CI)
Age				
>35 years old	-	Ref	-	Ref 1.2 (0.7-2.4)
≤35 years old	0.046	0.6(0.4-0.9)	0.519	
Level of education				
Non-academic	-	Ref	-	Ref
University	<0.001	13.3(8.3-21.2)	<0.001	18.5(8.5-40.2)

Anterior anesthesia				
No experience	-	Ref	-	Ref
at least one experience	0.002	1.8(1.2-2.7)	0.004	0.4(0.3-0.8)
Explanation/CPA				
Not detailed	-	Ref	-	Ref
Detailed	<0.001	0.1(0.04-0.1)	<0.001	0.04(0.02-0.09)
Type of surgery				
Others	-	Ref		Ref
Neurosurgery	0.006	0.56(0.4-0.9)	0.572	0.76(0.3-1.9)
Gynecological	<0.001	2.6(1.6-4.2)	0.286	1.6(0.7-3.6)
Nature of the intervention				
Scheduled	-	Ref	-	Ref
Urgent	<0.001	2.1(1.3-3.2)	0.831	0.9(0.5-1.9)
Type of anesthesia				
Regional anesthesia	-	Ref	-	Ref
General anesthesia	0.001	0.5(0.4-0.8)	0.152	1.8(0.8-3.8)
Surgery-related anxiety				
No	-	Ref	-	Ref
Yes	<0.001	4.7(3.1-7.2)	0.552	0.8(0.4-1.6)
Need information				
Weak	-	Ref	-	Ref
Moderate desire	<0.001	2.5(1.7-3.6)	0.026	2.14(1.1-4.2)
High desire	<0.001	3.57(2.1-5.9)	0.701	1.19(0.5-2.9)

In multivariate analysis after adjustment, several factors remained significantly associated with preoperative anesthetic anxiety. Educational attainment was a factor strongly associated with anxiety. Patients with a university education had a higher probability of anxiety than patients without a university education [aOR=18.5 (95% CI: 8.5–40.2); p < 0.001]. Prior anesthetic experience also remained associated with anxiety after adjustment. Prior anesthetic experience was associated with a lower probability of anxiety [aOR=0.4 (95% CI: 0.3–0.8); p = 0.004]. providing a thorough Having explanation during the pre-anesthetic consultation was strongly associated with a lower probability of anxiety [aOR=0.04 (95% CI: 0.01–0.9); p < 0.001]. Finally, compared to patients reporting a low need for information, those with a moderate desire for information were about 2 times more likely to experience anesthetic anxiety [ORa=2.1 (95% CI: 1.1-4.2), p=0.026].

4. Discussion

This study was conducted to determine the frequency and factors associated with preoperative anxiety in patients undergoing anesthesia in Kinshasa. Despite some methodological limitations, this study provided important data on anesthesia-specific preoperative anxiety in the Kinshasa hospital setting. The use of the APAIS scale allowed us to assess not only anesthesia-related anxiety, but also surgery-related anxiety and patients' need for information. The acceptable internal consistency observed in our study therefore supports the use of this instrument in the studied population.

The study showed that the frequency of preoperative anxiety specific to anesthesia remains significant after assessment with the APAIS scale. Patients who received explanations generally had lower scores than those who did not. Concern about anesthesia was significantly lower in patients who received explanations. Similarly, thinking about anesthesia was less pronounced in informed patients. However, the desire to know everything about anesthesia did not differ significantly between the two groups, although the score was slightly lower in patients who received explanations.

Regarding anxiety about anesthesia, only 14.5% of patients who received explanations were anxious, compared to 70.5% of those who did not (p<0.001). The need for information score was also significantly different between the two groups, with a higher score in patients who did not receive explanations. Several parameters were associated with anesthesia-specific preoperative anxiety, including: the young age of the patients, their level of education, prior anesthetic experience, the explanation of the anesthesia procedure provided during the preoperative assessment, the type of surgery, the nature of the procedure, the type of anesthesia, surgery-related anxiety, and the need for information. Anxiety was also highly associated with the occurrence of intraoperative anesthetic incidents (p<0.001), patient awakening (p<0.001), and the occurrence of postoperative anesthetic complications (p=0.003). Several factors were identified as being associated with anesthesia-specific preoperative anxiety, including: educational level, prior anesthetic experience, provision of an explanation during the preoperative assessment, and average desire for information.

Frequency of preoperative anxiety specific to anesthesia

Our study revealed a 48% prevalence of preoperative anxiety specific to anesthesia. This result shows that nearly one in two patients experienced significant anxiety about anesthesia before their procedure. This frequency is close to that reported by Lukeba et al., in a study conducted in Kinshasa with adult patients, who found 51.9% using the state-trait Anxiety Inventory (STAI) [10]; as well as several African studies that reported significant proportions of preoperative anxiety. Kassogué et al., in Mali, reported a high frequency of preoperative anxiety in surgical settings [15]. Studies conducted in Ethiopia have also shown that preoperative anxiety is a common problem among patients undergoing surgery [18, 19, 20].

The differences observed between studies can be explained by the characteristics of the populations studied, the types of surgical interventions, the urgent or scheduled nature of the interventions, socio-cultural and organizational differences, as well as the instruments used to measure anxiety. It is also worth noting that our study specifically focused on anxiety related to anesthesia, whereas several previous studies have assessed overall preoperative anxiety. These results confirm that preoperative anxiety is a common problem that deserves special attention during anesthetic preparation.

Patient concerns and information needs

Analysis of the different items of the APAIS showed that patients had significant concerns regarding both anesthesia and the surgical procedure. A large proportion of patients reported being worried about anesthesia and thinking about it regularly. The need for information about anesthesia and the surgical procedure was also significant. These observations are consistent with those of Moerman et al., who found that more than 80% of patients had a favorable attitude toward information and that patients with a greater need for information also exhibited higher levels of anxiety. The German validation of the APAIS also found an association between the need for information and anxiety, with a correlation of r = 0.59 [12].

These results highlight that patients are not only seeking technical support for their procedure. They also need to understand the procedures they will undergo. Therefore, the need for information should be considered an essential element of preoperative preparation. Systematic assessment of patient expectations could allow the anesthesia team to tailor the information provided and improve the quality of communication. Consequently, the need for information should not be considered a mere secondary element of preoperative preparation. It could constitute a marker of vulnerability to anxiety, but also an opportunity for intervention by the anesthesia team. Furthermore, the need for information was also a significant factor associated with preoperative anxiety. Patients expressing a moderate need for information were more likely to experience anxiety than those expressing a low need for information.

Age and preoperative anxiety

In our study, age was associated with preoperative anxiety in bivariate analysis. Patients aged 35 years or younger had a higher proportion of anxiety than those aged over 35 years. This result is consistent with several studies that have reported higher anxiety levels in younger patients. This is notably the case in Claire Coquempot's study, which found that a high APAIS score was expected in older patients, who are often anxious. However, this score was actually quite high in younger subjects [13]. In contrast, Bahaeldin Hassan et al. found no association between preoperative anxiety and patient age [14]. Indeed, younger patients may have a different perception of surgical and anesthetic risk, less experience with hospital care, or greater anxiety about the uncertainty surrounding the procedure. However, this association did not remain significant after adjustment in our study. Therefore, age cannot be considered an independent factor of anxiety in our final model.

Sex and preoperative anxiety

This study showed that no statistically significant association was observed between sex and preoperative anxiety, although the proportion of anxiety was slightly higher in women. Several international studies have reported a higher frequency of anxiety in women. This is the case for Edmund N Ossai et al., who reported that men were half as likely to experience significant anxiety as women (ORa = 0.583, 95% CI: 0.370–0.918) [11]. Moerman et al. observed that women were more anxious than men [12]. Similarly, Adingra SCE et al. found that a high level of anxiety, defined as a score between 56 and 65 on the Spielberger State Anxiety Scale, was observed in 8 exclusively female patients [21]. Indeed, the differences observed in our study may be related to the characteristics of the studied population, the sample composition, and the diversity of surgical procedures. These results show that the factors associated with preoperative anxiety can vary considerably across populations and healthcare settings.

Education level and preoperative anxiety

This study noted that educational attainment was one of the main factors associated with anesthesia-specific preoperative anxiety. Patients with a university education had a significantly higher probability of anxiety after adjustment. These results are similar to those of Edmund N. Ossai et al., who reported that individuals with a primary or lower level of education were half as likely to experience significant anxiety as those with a higher level of education (aOR = 0.407, 95% CI: 0.198–0.835) [11]. In contrast, Ashenafi Nuri et al. reported that high preoperative anxiety was associated with a lack of schooling (aOR: 3.75; 95% CI: 1.36–10.39) [22]. Bahaeldin Hassan et al. found no association between preoperative anxiety and educational attainment [14]. This result may seem paradoxical. A high level of education can foster a better understanding of medical information, but also a greater search for information and a heightened awareness of the potential risks associated with anesthesia and surgery. Thus, a better understanding of risks does not necessarily lead to a decrease in anxiety. This is consistent with the findings of Moerman et al., who observed that the need for information is closely linked to anxiety levels and educational attainment [12]. Hence, the necessity and importance of always tailoring preoperative information to the specific profile and needs of each patient.

Type and nature of the intervention in response to preoperative anxiety

In the present series, the type of surgery was associated with anxiety in bivariate analysis. The highest proportions of anxiety were observed in patients undergoing certain specialized procedures, particularly in neurosurgery and gynecology. This is also the case for Edmund N. Ossai et al., who reported that respondents undergoing major surgery were 2.2 times more likely to experience significant anxiety than those undergoing minor surgery (ORa = 2.235, 95% CI: 1.189–4.203) [11]. Indeed, the urgency of the procedure was also associated with a higher proportion of anxiety in this study. This observation is clinically plausible. An urgent procedure leaves little time to prepare the patient psychologically, explain the procedures, and answer their questions. Patients facing an emergency situation may also simultaneously experience pain, concern about their diagnosis, prognostic uncertainty, and fear related to the need

for rapid intervention. However, these variables were no longer significantly associated with anxiety after adjustment, suggesting that their effect could be influenced by other patient characteristics or their care.

Prior anesthetic experience and preoperative anxiety

In this study, prior anesthetic experience was significantly associated with a lower probability of anxiety after adjustment. However, the literature on this point remains variable [79]. The German validation of the APAIS notably reported that APAIS scores were not significantly dependent on prior interventions, whereas Moerman observed that patients who had never undergone surgery expressed a greater need for information [12]. Indeed, patients who have already received anesthesia may be more familiar with the hospital environment and the anesthetic procedure. Conversely, patients who have never been anesthetized may be more confronted with the fear of the unknown. This observation confirms the importance of appropriate preparation for patients who will receive anesthesia for the first time.

Role of pre-anesthetic consultation and information

In this series, one of the major findings of our study concerns the observed association between the explanations received during the pre-anesthetic consultation and a lower probability of anxiety. Patients who received thorough explanations about the procedure of their anesthesia had a significantly lower rate of anxiety than patients who received little or no information. This association remained highly significant after adjustment. This confirms the observations of studies that have evaluated the impact of video on patients' preoperative anxiety [13, 14]. The pre-anesthetic consultation therefore represents a crucial opportunity to establish a relationship of trust between the patient and the anesthesia team. It should not be limited to clinical evaluation and the identification of anesthetic risk factors. It should also allow for: explaining the procedure of the anesthesia; informing the patient about the different stages of their care; addressing their concerns; identifying their information needs; and reducing uncertainty and misconceptions. However, due to the observational nature of our study, this association does not allow us to state with certainty that the explanations directly caused a decrease in anxiety.

Type of anesthesia and preoperative anxiety

Our series revealed that, in bivariate analysis, the type of anesthesia was associated with preoperative anxiety. Patients scheduled for general anesthesia presented a higher proportion of anxiety than those scheduled for regional anesthesia. These observations are consistent with those of Edmund N. Ossai et al., who showed that significantly higher anxiety was observed with general anesthesia using the NRS-A scale, but not with the APAIS instrument [11]. In contrast, Bahaeldin Hassan et al. found no association between preoperative anxiety and the type of anesthesia [14]. This difference could be related to the perception of loss of consciousness, loss of control, intubation, and potential complications associated with general anesthesia. However, this association did not persist after adjustment in the multivariate model.

Anxiety and perianesthetic evolution

Our study highlighted associations between preoperative anxiety and certain events occurring during or after anesthesia. Anxious patients more frequently experienced intraoperative incidents, altered awakening patterns, and postoperative complications. These results confirm data from several clinical trials, which suggest that preoperative anxiety is a risk factor for the development of acute or chronic postoperative pain, leading to the failure of some surgeries. It may also increase the consumption of certain anesthetic drugs (propofol and sevoflurane) and, consequently, their side effects, such as delayed awakening, the incidence of postoperative nausea and vomiting (PONV), including postoperative behavioral disturbances, particularly in children [3-10].

These observations are also consistent with the hypothesis that anxiety can influence the physiological stress response and alter certain perioperative parameters. However, the observational nature of the study does not allow for establishing a causal relationship between anxiety and perianesthetic events [5] . Other factors, including the type of surgery, the urgency of the procedure, the patients' clinical condition, and the anesthetic technique, could contribute to the observed associations. Studies specifically designed to assess the prognostic effect of preoperative anxiety would be needed to better define this relationship.

5. Conclusion

Anesthesia-specific preoperative anxiety was observed in 48% of adult surgical patients included in this multicenter study conducted in Kinshasa. A moderate level of university education and information needs were associated with a higher probability of anxiety, while prior anesthetic experience and explanations provided during the pre-anesthetic consultation were associated with a lower probability.

These results highlight the importance of assessing patients' concerns and providing them with clear, personalized information before anesthesia. Integrating rapid anxiety screening and structured communication with patients during routine pre-anesthetic consultations could help improve psychological preparation. Further studies are needed to determine whether targeted educational interventions can reduce anxiety and improve perioperative outcomes.

Conflicts of Interest

The authors declare that they have no conflict of interest.

Contributions from the Authors

Gibency Mfulani participated in the design of the study, data collection, analysis and manuscript writing.
Berthe Barhayiga and Célestin Kaputu participated in the design and supervision of the study.
Medard Bulabula corrected the manuscript.
Wilfrid Mbombo, Alphonse Mosolo, Jean Jacques Kalongo, Patrick Mukuna, Patricia Kabuni, Christian Nantulu, Didier Kandongo, If Bikoko, Laurence Bamporiki and Yannick Mukendi facilitated data collection

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