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SCIENTIFIC ARTICLE

Preoperative education reduces preoperative anxiety in cancer patients undergoing surgery: Usefulness of the self-reported Beck anxiety inventory



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KEYWORDS

Pre-anesthetic evaluation;
Anxiety;
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Abstract

Background and objectives: Preoperative instruction is known to significantly reduce patient anxiety before surgery. The present study aimed to investigate the effects of preoperative education on the level of anxiety of cancer patients undergoing surgery using the self-reported Beck anxiety inventory.

Methods: This study is a short-term observational study, including 72 female patients with a diagnosis of endometrial cancer who were scheduled to undergo surgical treatment under general anesthesia. During the pre-anesthetic consultation 15 days before surgery, one group of patients (Group A, $n=36$) was given comprehensive information about their scheduled anesthetic and surgical procedures, while the other group of patients (Group B, $n=36$) did not receive any information pertaining to these variables. The Beck anxiety inventory, blood pressure and heart rate were evaluated before and after the preoperative education in Group A. In Group B, these parameters were evaluated at the beginning and at the end of the consultation.

Results: The hemodynamic values were lower in the group that received preoperative education, in comparison with the group that did not receive preoperative education. Educating the patients about the procedure resulted in a reduction in the levels of anxiety from mild to minimum, whereas there was no change in the group that did not receive the preoperative education. This latter group kept the same level of anxiety up to the end of pre-anesthetic consultation.

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PALAVRAS-CHAVE

Avaliação pré-anestésica; Ansiedade; Inventário Beck de ansiedade; Câncer

Conclusions: Patient orientation in the preoperative setting should be the standard of care to minimize patient anxiety prior to surgery, especially for patients with cancer.

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A informação no pré-operatório reduz a ansiedade pré-operatória em pacientes com câncer submetidos à cirurgia: utilidade do Inventário Beck de Ansiedade

Resumo

Justificativa e objetivos: A informação transmitida no pré-operatório é conhecida por reduzir de modo significativo a ansiedade do paciente antes da cirurgia. O presente estudo teve como objetivo investigar os efeitos da orientação pré-operatória sobre o nível de ansiedade de pacientes com câncer submetidos à cirurgia, utilizando o inventário Beck de ansiedade.

Métodos: Estudo observacional de curto prazo, incluindo 72 pacientes do sexo feminino com diagnóstico de câncer endometrial, programadas para receber tratamento cirúrgico sob anestesia geral. Durante a consulta pré-anestésica, 15 dias antes da cirurgia, um grupo de pacientes (Grupo A, n=36) recebeu informações abrangentes sobre seus procedimentos anestésicos e cirúrgicos, enquanto o outro grupo de pacientes (Grupo B, n=36) não recebeu qualquer informação referente a essas variáveis. O inventário Beck de ansiedade, a pressão arterial e a frequência cardíaca foram avaliados antes e após a transmissão de informações ao Grupo A. No Grupo B, esses parâmetros foram avaliados no início e no final da consulta.

Resultados: Os valores hemodinâmicos foram menores no grupo que recebeu informação pré-operatória, em comparação com o grupo que não recebeu informação pré-operatória. Informar os pacientes sobre o procedimento resultou em uma redução dos níveis de ansiedade de leve a mínimo, enquanto não houve mudança no grupo que não recebeu informação pré-operatória. Esse último grupo manteve o mesmo nível de ansiedade até o final da consulta pré-anestésica.

Conclusões: A orientação do paciente no período pré-operatório deve ser o atendimento padrão para minimizar a ansiedade dos pacientes antes da cirurgia, especialmente os pacientes com câncer.

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Introduction

Some studies have shown that pre-anesthetic assessment prior to major surgery optimizes perioperative management and surgical outcomes.^{1,2} In the specific context of patients undergoing very stressful surgical procedures, including cancer surgery, the reduction of preoperative anxiety using benzodiazepines, has already been shown to result in a better management of postoperative pain.³

Preoperative anxiety is also known to increase the patient's release of catecholamines, resulting in an increase in blood pressure, heart rate and arrhythmia.^{4,5} The assessment of anxiety is of paramount importance because the symptoms and complaints caused by anxiety can interfere with the patient's quality of life.^{6,7} Furthermore, anxiety is a common condition in cancer patient populations that warrants early identification and management by health professionals.⁸ Cancer patients have additional challenges related to the life-threatening nature of the disease,⁹ the potential impact of surgery on their body image,¹⁰ and the additional impact of non-surgical treatments, such as chemotherapy or radiotherapy, on their well-being.¹¹

A number of scales rated as being of high quality have been developed to assess a patient's degree of anxiety and depression,¹² including State-Trait Anxiety Inventory (STAI), Hamilton Anxiety Scale (HAS), Amsterdam Preoperative Anxiety and Information Scale.¹²⁻¹⁴ The Hospital Anxiety Depression Scale (HADS) is one of the most systematically evaluated anxiety measures, but it is limited by cut-point variability.¹² Moreover, the HADS is least recommended in cancer patients.¹² In contrast, the Beck anxiety inventory (BAI) is considered to be the gold standard of anxiety measurement, mainly because of its brevity, simplicity, and presumed ability to measure general anxiety.¹⁵ In addition, it has been suggested that the BAI is able to measure anxiety while minimizing its overlap with depression.¹⁶ In fact, the BAI is a short-term measure of anxiety centered on somatic symptoms of anxiety, which was developed to discriminate between anxiety and depression.¹⁶

The present study aimed to investigate the effects of preoperative education on the level of anxiety of cancer patients undergoing a total hysterectomy and bilateral adnexectomy. We used the BAI in two groups of patients; one group received complete information about their scheduled

anesthesiology and surgery 15 days before their scheduled surgical procedure, while the other group did not receive information on these factors.

Materials and methods

Patients

After approval by the local Institutional Review Board of the National Cancer Institute, Rio de Janeiro, Brazil, a short-term prospective observational clinical study was performed with 72 female patients, aged more than 18 years with an American Society of Anesthesiology (ASA) patient classification status of II or III. After giving informed consent, patients were observed in an outpatient pre-anesthetic setting of the National Cancer Institute, Rio de Janeiro, Brazil. The study was approved by the local Institutional Review Board (National Cancer Institute, protocol number 117/09).

After admission, the anthropometric and cardiovascular parameters (blood pressure and heart rate) were measured. All of the patients had a diagnosis of endometrial cancer and were scheduled to undergo a total abdominal hysterectomy and bilateral adnexectomy under general anesthesia. All patients included in the study had been previously assessed by the psychology service of the hospital. Only the patients that did not present with definite symptoms of depression at the time of inclusion were selected for the study.

Inclusion/exclusion criteria and questionnaire description

We included female patients between the ages of 18 and 80 years. Based on self-report instruments, the psychology department of our institution evaluated the patients to determine whether they were able to respond to the BAI questionnaire. Patients presenting with psychiatric disorders and with definite symptoms of depression were excluded from the study. Moreover, patients under anxiolytic or antidepressant treatments were also excluded from the study.

The anesthesiologist (M.F.L.) in charge of the pre-anesthetic consultation explained the instructions for the BAI questionnaire (translated and validated for the Brazilian Portuguese)^{17,18} to the patients before the patients responded to the questions. The BAI questionnaire included 21 descriptive statements that asked the patients about their anxiety symptoms. For each item of the assessment, the patient selected a response among the following four scoring levels: 0 equated to "absolutely not"; 1 equated to "slightly, does not bother me too much"; 2 equated to "moderately, it was very unpleasant, but bearable"; or 3, which equated to "unbearable". The sum of the 21 individual scores for each patient represented their total score, which could vary from 0 to 63. Beck defined the degree of patient anxiety as 4 levels as follows: minimum (scores from 0 to 10), mild (scores 11 to 19), moderate (scores of 20 to 30), and severe (scores from 31 to 63).⁹

Patient anxiety assessment

Fifteen days prior to the patient's scheduled surgery, the patients were scheduled to have an outpatient consultation in which a baseline BAI measurement was determined. After admission in the pre-anesthetic setting, the patients were randomly assigned to two groups. The patients were allocated to one of the groups using randomly permuted blocks (1:1 randomization of 2 groups), in blocks of 4 and based on a table of random numbers. Group A was given complete information about their scheduled anesthetic and surgical procedures, perioperative care, and pain control during their pre-anesthetic evaluation, including computer-based explanations.¹⁹ For that purpose, we used real-life photographs, including different features of anesthesia and surgery: (1) Dress code in the operating room, including surgical masks, hair and shoe covers, sterile gowns and gloves; (2) The main entrance to the operating theater, operating rooms and post-anesthesia care units; (3) Pictures and brief explanation of the anesthesia monitor equipment, including blood pressure cuff, pulse oximeter, electrocardiogram, oxygen and carbon dioxide analyzers; (4) Anesthetist performing anesthetic procedures; (5) Main procedures for postoperative pain relief. This computer-based education was standardized for pre-anesthetic consultations in our hospital. Group B did not receive any information pertaining to these variables. Two hours after the baseline BAI evaluation, a second evaluation was performed to exclude external factors, such as psychotherapy or anxiolytic medications, that might interfere with the patient's level of anxiety. Respecting the principles of medical ethics, patients in Group B were declassified and received the same information as group A described above at the end of the preoperative consultation. All patients remained in the recreation zone of the hospital between the two BAI evaluations, listening to music or watching television. We presume that there were no significant external stressing factors interfering in the humor status of the patients. Blood pressure and heart rate were also measured immediately before the two BAI evaluations, to test indirectly the effects of preoperative education on the systemic release of catecholamines and the subsequent reduction in cardiovascular parameters.

Statistical analysis

The anthropometric and hemodynamic values were shown as means \pm SD. They passed normality by the Shapiro-Wilk test. Following the one way analysis of variance the paired intragroup or the unpaired intergroup two-tailed Student's *t*-tests, as appropriate, were calculated. For the values that did not follow a Gaussian distribution, the medians (25th–75th percentile) were presented.

The internal consistency of the BAI questionnaire was evaluated using reliability tests. The Cronbach's alpha psychometric test ranged from 0.90 to 0.94 as well as the test-retest coefficients indicating the range from 0.62 (7 week interval) to 0.93 (1 week interval) were reasonable. The sample size of the Group A was calculated with a confidence level of 0.95 and a power of 0.8 between two

proportions formed by the first and second BAI tests. Group B was analyzed the same way as Group A to find out possible bias. The Wilcoxon matched pairs test or Mann–Whitney test, as appropriate, were used to find out the significance among the BAI group scores. *p*-values <0.05 were considered statistically significant. The Prism statistical package, version 7.0 (GraphPad Software Inc. La Jolla, CA, USA) was utilized for data analysis.

Results

The groups were matched according to age, weight, and height, as shown in Table 1. The hemodynamic parameters, including blood pressure and heart rate, were significantly reduced in the second BAI evaluation in the group of patients receiving preoperative education (Table 1). In contrast, the group of patients who did not receive preoperative education did not show reductions in hemodynamic parameters (Table 1). Consequently, the hemodynamic values before the second BAI evaluation were lower in the group receiving preoperative education, in comparison with the group that did not receive preoperative education (Table 1).

Regarding the second BAI assessment, the group of patients receiving preoperative education reported a much higher number of 0 scores and significantly fewer 2 and 3 scores, compared to the group of patients who did not receive preoperative education (Table 2). Moreover, there was a significant increase in 0 scores and a reduction of 2 and 3 scores in the second BAI evaluation in the group of patients receiving preoperative education. On the other hand, in the group of patients who did not receive preoperative education, there were no changes in the BAI scores, when compared to the first evaluation. There were no changes in the scores for both groups of patients. Thus, the level of anxiety showed to be significantly lower after preoperative education.

Overall, educating patients resulted in lower levels of anxiety from mild to minimum, whereas there was no change in the group that did not receive preoperative education, which had a constant mild level of anxiety (Table 2).

Discussion

This study showed that pre-surgery anxiety levels of cancer patients can be significantly reduced by educating patients on the planned surgical and anesthetic procedures in a preoperative anesthetic setting. Both patient groups in our study had similar anthropometric parameters, ASA status, planned surgical procedures and types of anesthesia; therefore, these variables are unlikely to have affected the evaluation of BAI scores. In the present study, the BAI questionnaire took approximately 10 min to complete. The BAI has been demonstrated to be sensitive to change over time both in psychiatric and medical populations.^{20,21}

Preoperative anxiety has been classically related to the patient's concerns about disease, hospitalization, anesthesia and surgery. Moreover, fear of the unknown is one of the most important sources of anxiety among surgical outpatients presenting to a pre-anesthetic consultation, especially before invasive surgery.^{22,23} It is recognized that preoperative anxiety and fear may lead to increases in the levels of stress hormones, resulting in undesirable metabolic responses before anesthesia, including high systemic catecholamine levels that result in increased arterial blood pressure and heart rate.^{24,25}

Nevertheless, the detailed evaluation of preoperative anxiety is uncommonly present in the pre-anesthetic consultation.²⁶ In this context, our study confirms that even short-term psychological interventions may prevent preoperative anxiety in cancer patients.^{27,28} It is noteworthy that women with advanced cancer are more likely to meet criteria for anxiety disorders, which has unfavorable effects on doctor–patient relationships and by extension may lead to poorer outcomes for these patients.²⁹

Nevertheless, reports in the literature present conflicting results. Although some studies report that preoperative education significantly reduces preoperative anxiety,^{27,29} others do not. For instance, Ortiz et al. reported that preoperative education using leaflets improved patient's satisfaction regarding their knowledge of the perioperative process but did not reduce anxiety related to surgery.³⁰ On the contrary,

Table 1 Anthropometric and hemodynamic data of the patients immediately before the first and second BAI evaluations.

Parameter	BAI evaluation	Group A (n = 36)	Group B (n = 36)
Age (years)		50.3 ± 15.2	53.8 ± 13.3
Weight (kg)		69.2 ± 18.9	70.0 ± 15.3
Height (cm)		159.0 ± 8.67	159.0 ± 6.38
SAP (mmHg)	First BAI	143.9 ± 28.8	143.6 ± 28.4
	Second BAI	129.0 ± 23.3 ^a	143.3 ± 28.3 ^b
DAP (mmHg)	First BAI	89.9 ± 17.2	87.4 ± 14.4
	Second BAI	78.6 ± 13.5 ^a	87.6 ± 13.3 ^b
HR (beats.min ⁻¹)	First BAI	79.4 ± 15.5	77.9 ± 8.9
	Second BAI	72.0 ± 11.8 ^a	77.7 ± 9.4 ^c

The values represent means ± SD.

Group A patients had preoperative education before responding to the second BAI; Group B patients did not have preoperative education before responding to the second BAI.

BAI, Beck anxiety inventory; SAP, Systolic Arterial Pressure; DAP, Diastolic Arterial Pressure; HR, Heart Rate.

^a *p* < 0.001 vs. first BAI; paired *t*-tests.

^b *p* < 0.0.

^c *p* < 0.01 vs. Group A second BAI; unpaired *t*-tests.

Table 2 Counting of score levels of anxiety of the patients and total anxiety scores obtained with BAI evaluation.

BAI score	BAI evaluation	Group A (n=36)	Group B (n=36)
0	First BAI	12.0 (10.0–15.0)	13.0 (11.0–14.7)
	Second BAI	17.5 (15.0–19.7) ^a	13.0 (10.0–14.0) ^b
1	First BAI	2.0 (1.0–3.0)	1.0 (0–2.7)
	Second BAI	2.0 (1.0–5.0)	2.0 (1.0–3.0)
2	First BAI	3.0 (2.2–5.0)	4.0 (2.2–5.0)
	Second BAI	0 (0–1.1) ^a	3.5 (2.2–5.0) ^b
3	First BAI	1.5 (0.2–5.7)	2.0 (0–4.0)
	Second BAI	0 (0–0) ^a	3.0 (0.2–5.0) ^b
Total scores	First BAI	18.0 (11.2–24.0)	16.5 (12.0–22.7)
	Second BAI	4.0 (1.0–7.0) ^a	18.0 (12.0–22.0) ^b

The results were presented as the medians (25th–75th percentile) because the values did not follow a Gaussian distribution (Shapiro–Wilk normality test). *P*-values were estimated using Mann–Whitney tests or Wilcoxon matched-pairs signed rank test, as appropriate.

Group A, patients had preoperative education before responding to the second BAI; Group B, patients did not have preoperative education before responding to the second BAI.

BAI, Beck anxiety inventory.

^a *P* < 0.001 vs. first BAI.

^b *P* < 0.001 vs. group A second BAI.

the use of informational 1 page leaflets has already been suggested to significantly reduce anxiety before surgery.³¹ Moreover, preoperative anxiety was shown to be reduced when additional anesthesia information in print and video format is made available prior to surgery.³²

Timing appears to be an important factor because some reports have shown that a pre-anesthetic visit the night before or the day of admission was insufficient to reduce anxiety.^{19,33} The present finding that a pre-anesthetic evaluation performed two weeks before surgery may reduce anxiety is consistent with previous studies. For instance, Klopfenstein et al. showed that the pre-anesthetic assessment in an outpatient consultation clinic one to two weeks before hospitalization, but not an assessment on the evening before surgery, significantly reduces preoperative anxiety.³⁴

In the present study, the systolic and diastolic blood pressure and heart rate measurements were significantly decreased by the second BAI evaluation in the group of patients receiving preoperative education, but these parameters did not change in the control group who did not receive preoperative education. These hemodynamic responses are consistent with the psychological changes we documented using the BAI scoring system. Furthermore, it is unlikely that decreases in the hemodynamic parameters in the group receiving preoperative education were due to acclimation to the preoperative anesthetic setting because the patients who did not receive preoperative education did not have a reduction in blood pressure or heart rate.

Limitations and strengths of the study

Limitations to this study must be considered. Most patients attending hospitals that belong to the public health system in our country are predominantly of low socioeconomic status. Moreover, the educational level of the patients was not evaluated in the present study. As a result, bias may have been introduced due to misunderstanding of questions on the BAI self-report questionnaire. Nevertheless, the

questionnaire was clearly explained to the patients by the anesthesiologist in charge of the pre-anesthetic consultation.

The major strength of our study was the use of the BAI criteria, which is a reliable instrument considered to reduce confusion between preoperative anxiety and reactive or endogenous depression.³⁵ Our results clearly demonstrate that a comprehensive pre-anesthetic consultation should be included in the evaluation of preoperative anxiety by the anesthesiologist using standardized and systematically validated methodology.

In conclusion, our study contributes to a growing body of evidence suggesting that patient orientation in the preoperative setting should be a standard of care to minimize patient anxiety prior to surgery, especially for patients with cancer.

Key messages

- Pre-surgery anxiety levels of cancer patients can be significantly reduced by educating patients on the planned surgical and anesthetic procedures in a preoperative anesthetic setting.
- Blood pressure and heart rate significantly decrease when patients receive preoperative education.
- Patient orientation in the preoperative setting should be a standard of care to minimize patient anxiety prior to surgery in patients with cancer.

Conflicts of interest

The authors declare no conflicts of interest.

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