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Preoperative Parental Anxiety and Concerns: A Prospective Observational Study

Ansiedade e Preocupações Parentais Pré-Operatórias: Um Estudo Observacional Prospetivo

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Keywords

Anxiety; Child; Parents; Preoperative Period; Seasons.

Palavras-chave

Ansiedade; Criança; Estações; Pais; Período Pré-Operatório.

ABSTRACT

Introduction: Current understanding of risk factors associated with parental anxiety focuses on socio-demographic and situational factors, yielding inconsistent results across different populations. Seasonality influences mood and anxiety in the general population through mechanisms like sunlight exposure (vitamin D synthesis, circadian rhythm regulation) and weather-imposed social isolation. Thus, this study was conducted to assess various factors associated with parental anxiety in order to improve the perioperative experience and outcomes for children and their parents.

Methods: Five hundred parents were included in the study, and the level of anxiety, need for information were assessed with the Amsterdam Preoperative Anxiety and Information Scale (modified by including questions in the local language) at time points: evening before surgery (T1); the preoperative holding area (T2), and after the child was transferred inside operation room (T3). The primary outcome of this study was to determine the changes in anxiety level and need for information about anesthesia and surgery among the parents at three different time points preoperatively. The secondary outcomes included analyzing the variables that can affect anxiety: gender, level of education, area of residence, access to internet and season of surgery. Parametric tests were used for significance, and repeated-measure analysis of variance was performed.

Results: Parents displayed higher levels of anxiety related to surgery compared to anesthesia. There was no effect of gender, education, area of residence, and Internet access on total anxiety score. Weather conditions are an important factor that can influence parental anxiety before surgery. Parents exhibited higher anesthesia-related and surgical anxiety levels during the summer season.

Conclusion: Apart from multiple well-documented factors, less studied factors like change in seasons may influence parental anxiety thus enabling health-care systems to proactively intensify supportive interventions (e.g., counselling, information sessions) during high-risk seasons, thereby mitigating anxiety and its negative downstream effects on both parents and their children.

RESUMO

Introdução: O entendimento atual dos fatores de risco associados à ansiedade parental concentra-se em fatores sociodemográficos e situacionais, produzindo resultados inconsistentes em diferentes populações. A sazonalidade influencia o humor e a ansiedade na população em geral através de mecanismos como exposição à luz solar (síntese de vitamina D, regulação do ritmo circadiano) e isolamento social imposto pelo clima. Assim, este estudo foi conduzido para avaliar vários fatores associados à ansiedade parental, a fim de melhorar a experiência perioperatória e os resultados para as crianças e seus pais.

Métodos: Quinhentos pais foram incluídos no estudo e o nível de ansiedade e a necessidade de informações foram avaliados com a Escala de Ansiedade e Informação Pré-operatória de Amsterdã (modificada pela inclusão de perguntas no idioma local) em diferentes tempos: noite antes da cirurgia (T1); área de espera pré-operatória (T2); e após a criança ser transferida para dentro da sala de cirurgia (T3). O *outcome* primário deste estudo foi determinar as mudanças no nível de ansiedade e na necessidade de informações sobre anestesia e cirurgia entre os pais em três momentos diferentes no pré-operatório. Os *outcomes* secundários incluíram a análise das variáveis que podem afetar a ansiedade: gênero, nível de educação, área de residência, acesso à internet e estação da cirurgia. Foram realizados testes paramétricos para significância e análise de medidas repetidas para variância.

Resultados: Os pais apresentaram níveis mais altos de ansiedade relacionados à cirurgia em comparação com a anestesia. Não houve efeito do gênero, educação, área de residência e acesso à internet no score total de ansiedade. As condições meteorológicas podem influenciar a ansiedade dos pais antes da cirurgia.

Conclusão: Além de vários fatores bem documentados, fatores menos estudados, como mudanças de estação, podem influenciar a ansiedade dos pais, permitindo assim que os sistemas de saúde intensifiquem proativamente as intervenções de apoio (por exemplo, aconselhamento, sessões de informação) durante as estações de alto risco, mitigando assim a ansiedade e seus efeitos negativos tanto nos pais como nos filhos.

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INTRODUCTION

Perioperative anxiety among parents of pediatric surgical patients presents a significant challenge for anesthesiologists and surgeons. Children are highly attuned to their parents' emotional states. An anxious parent can inadvertently amplify their child's fear and anxiety, making separation from parents traumatic and the induction of anesthesia difficult. This stress can negatively impact the pediatric patient's surgical experience, leading to a higher incidence of postoperative pain, longer hospital stays, and potential long-term behavioral problems.¹ Heightened parental anxiety can impair a parent's ability to care for and comfort their child during this stressful period.²

While self-reported state and trait anxiety have been widely studied, the factors influencing parental anxiety—such as gender, education level, habitat (urban versus rural), and internet access—vary considerably across different socio-economic and cultural contexts.¹ This variation makes it difficult to establish a uniform global protocol for managing parental anxiety. The known contributing factors include the quality of information provided and a parent's inherent susceptibility to stress.⁴ Interestingly, the relationship between weather conditions and anxiety has also been discussed in the literature, with irregular but notable findings suggesting a possible relationship between the two.⁵ However, the specific influence of seasonal variations on preoperative parental anxiety remains unexplored.

This study aimed to assess the parental anxiety levels related to anesthesia and surgery, quantify the need for information, and evaluate the association of key independent variables. The primary outcome of this study was to determine the changes in anxiety level and need for information about anesthesia and surgery among the parents at three different time points preoperatively. The secondary outcomes included analyzing the variables that can affect anxiety: gender, level of education, area of residence, access to the Internet and season of surgery.

METHODS

This prospective observational study was conducted after approval from the institutional ethics committee [Letter No. 488/IEC/2018/IGIMS]. After approval, the study was prospectively registered with the Clinical Trials Registry – India (CTRI/2018/09/015788). Informed written consent was taken from all the parents prior to enrolling the patient's parents for the study. As part of this process, participants were fully informed about the study's purpose, the data to be collected, and the measures taken to ensure their confidentiality and anonymity.

Participant recruitment employed a consecutive sampling method. All eligible parents of pediatric surgical patients admitted at least 24 hours before their child's operation were approached for enrolment. Eligibility required the ability to comprehend the study and provide informed written consent. Parents with psychiatric diseases or intellectual retardation and those taking anti-anxiety, antidepressant, or seda-

tive medications were excluded from the study. The study was conducted at a university hospital in accordance with the Helsinki Declaration (as amended in 2013).

All participants underwent routine preoperative counseling in the outpatient department by the surgeon and in the preanesthetic clinic by an anesthesiologist using the Amsterdam Preoperative Anxiety and Information Scale (APAIS). The APAIS was translated into English language (backward translations) by two different linguists; responses were translated back into English language (backward translations) by two different linguists. The measurement of agreement with these statements was graded on a 5-point Likert scale (1 = not at all..., to 5 = extremely). They were asked to put a tick [✓] mark where appropriate and no further counselling was done. This process was undertaken at three points time; the evening before surgery (T1), in the preoperative holding area before (T2) and after (T3) the child was transferred into the operating room for surgery.

APAIS

The APAIS questionnaire consists of six items. The responses are assessed using two metrics: the anxiety score and the information-seeking score. The anxiety score was derived by combining the scores attributed to the statements "I am worried about the anesthetic," "The anesthetic is on my mind continually," "I am worried about the procedure," and "The procedure is on my mind continually," to assess the patient's anxiety level concerning anesthesia and surgery. The desire for information score is derived by combining the scores attributed to the statements "I would like to know as much as possible about the anesthetic" and "I would like to know as much as possible about the procedure" to assess the patient's level of desire for information concerning anesthesia and surgery. Elevated scores signify an increased level of anxiety and a heightened need for information. The items are rated on a five-point Likert scale with "not at all" (1) and "extremely".⁵

Outcome parameters seen were the Total Anxiety score (TA) = Sum of responses of items 1, 2, 4, and 5; the Anesthesia-related anxiety score (AA) = Sum of responses of items 1 and 2; the Surgery-related anxiety score (SA) = Sum of responses of items 4 and 5; the Need for information score (INF) = Sum of responses of items 3 and 6.

The primary outcome of this study was to determine the changes in anxiety level and need for information about anesthesia and surgery among the parents at three different time points preoperatively. The secondary outcomes included analyzing the variables that can affect anxiety: gender (male/female), level of education (illiterate/high school/ intermediate/ graduate/postgraduate), area of residence (rural/urban), access to internet and season of surgery (winter—1st December to 31st January, spring—1st February to 31st March, summer—1st April to 31st May, and rainy—1st June to 31st July).

Sample size calculation

The sample size was calculated considering the proportion of anxiety level scores more than 11 in 44%, as reported by

Kobayashi *et al.*⁶ After taking a 10% relative margin of error and keeping the level of significance at 5% and keeping attrition at 10%, the sample size was calculated to be 500. The number of participants recruited was kept at 125 for each time period to encompass all seasons in order to enroll a total of 500 patients.

Statistical analysis

For statistical analysis, SPSS, version 22.0 [IBM, USA], and Stata, version 10 [Stata Corp, USA] were used. Categorical values were presented as frequency and continuous variables were presented as mean with standard deviation. All continuous variables, like various scores, were tested for normality using Shapiro-Wilks test, p -value > 0.05 were considered normally distributed variables. Considering a large sample size i.e. $n=500$, parametric tests were used for the significance. P -value <0.05 was considered for statistical significance. Repeated-measure analysis of variance was performed.

RESULTS

A total of 500 parents of children admitted for surgery were enrolled during the study period. The selection of participants is described in the flow diagram (Fig. 1). The gender-wise socio-demographic characteristics of the participants are shown in Table 1. A predominance of the male gender (68.6%) was observed. The educational status was significantly better among the male parents as compared to the female parents (p -value <0.001). The majority of participant parents (81.2%) were from rural areas. Only 131 (26.2%) participants had internet access, which was significantly higher among males as compared to females (p -value <0.001).

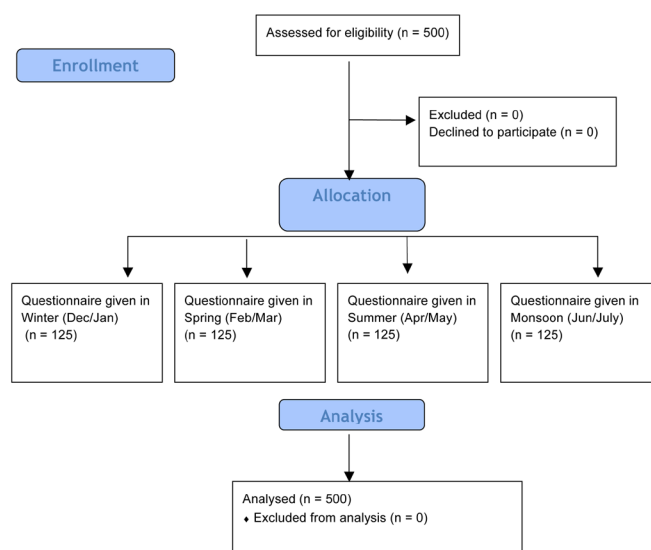


Figure 1. STROBE diagram of study participants.

Surgery-related anxiety scores were found to be significantly different over three time points, with a significant difference between Time 2 and Time 3 (p -value = 0.001, Bonferroni corrected p -value) (Table 2). There was no effect of gender, education, area of residence, and Internet access on total anxiety

Table 1. Gender-wise socio-demographic characteristics of the participants.

Characteristics	Male (n=343)	Female (n=157)	Total (n=500)	P-value
Season				
Winter	91	34	125	0.061
Spring	75	50	125	
Summer	93	32	125	
Rainy	84	41	125	
Educational Status				
Illiterate	24	44	68	<0.001
Matric	134	64	198	
Inter	88	22	110	
Graduate	87	24	111	
	10	3	13	
Area of Residence				
Rural	272	134	406	0.108
Urban	71	23	94	
Internet Access				
Yes	112	19	131	<0.001
No	231	138	329	

Table 2. Comparison of anesthesia-related anxiety, surgery-associated anxiety, total anxiety, and need for information score among the participants.

Outcomes	Time Points			P-value
	T1 Mean (SD) [95% CI]	T2 Mean (SD)	T3 Mean (SD)	
Total Anxiety Score	14.70 (2.76) [14.46, 14.94]	14.93 (2.78) [14.69, 15.17]	14.74 (4.78) [14.32, 15.16]	0.551
Anesthesia Related Anxiety Score	6.57 (2.22) [6.38, 6.76]	6.56 (2.11) [6.37, 6.75]	6.81 (2.59) [6.58, 7.04]	0.162
Surgery related Anxiety Score	8.13 (1.47) [8.00, 8.26]	8.37 (1.52) [8.24, 8.50]	7.93 (2.68) [7.69, 8.17]	0.002*
Need for Information Score	6.50 (2.01) [6.32, 6.68]	6.56 (1.91) [6.39, 6.73]	6.62 (2.32) [6.42, 6.82]	0.643

* T2 vs T3 p -value = 0.001; T1—the evening before surgery, T2—preoperative holding area, and T3—after the child was transferred inside the operation room for surgery.

score across all time points. The season of the year during which the surgery took place was found to be significantly associated with the total anxiety score ($p<0.001$) (Table 3). Gender ($p=0.011$) and season ($p<0.001$) had a significant effect on anesthesia-related anxiety scores but were not dependent on time (Table 3). However, there was no effect of education, area of residence, and internet access on anesthesia-related anxiety scores across the time (Table 3). Season ($p<0.001$) had a significant effect on surgery-related anxiety score over time ($p<0.001$). However, there was no effect of gender, education, area of residence, and Internet access on surgery-related anxiety scores across time (Table 3). All factors, i.e., season ($p<0.001$), education ($p<0.001$), area of residence ($p=0.007$), and internet access ($p=0.001$), were found to have a significant impact on the need for information score but were independent of time (Table 3).

DISCUSSION

A substantial subset of patients posted for surgery belongs to the pediatric age group. The parents are equal participants in the process of a child undergoing major surgical procedures, and they have a significant effect on the child's perioperative course. Although Spielberger's State-Trait Anxiety Inventory

Table 3. Factors having positive association with Total Anxiety Score, Anesthesia-related Anxiety Score, Surgical-related Anxiety Score, and Need for Information Score over three time points.

Factors	Time Points			P-value
	T1 Mean (SD) [95% CI]	T2 Mean (SD) [95%CI]	T3 Mean (SD) [95%CI]	
Total Anxiety Score				
Season				
Winter	14.92 (2.71) [14.68,15.15]	15.26 (2.43) [15.05,15.47]	15.80 (4.80) [15.38, 16.22]	<0.001
Spring	14.30 (3.14) [14.02, 14.57]	14.30 (2.82) [14.05, 14.55]	13.25 (5.18) [12.79, 13.71]	<0.001
Summer	15.08 (2.65) [14.84, 15.31]	15.52 (2.31) [15.32, 15.72]	15.67 (5.13) [15.22, 16.12]	0.538
Rainy	14.48 (2.47) [14.26, 14.70]	14.23 (3.19) [13.95, 14.51]	14.20 (3.33) [13.91, 14.49]	0.040
Anesthesia-Related Anxiety Score				
Gender				
Male	6.46 (2.22) [6.26, 6.66]	6.44 (2.14) [6.25,6.63]	6.64 (2.64) [6.21,6.67]	
Female	6.82 (2.21) [6.63, 7.01]	6.81 (2.02) [6.63,6.99]	7.18 (2.45) [6.96,7.40]	
Season				
Winter	6.42 (1.97) [6.25, 6.59]	6.62 (1.79) [6.46,6.78]	7.04 (2.43) [6.83,7.25]	<0.001
Spring	6.07 (2.17) [5.88, 6.26]	6.31 (2.17) [6.12,6.50]	5.94 (2.99) [5.68,6.20]	<0.001
Summer	6.52 (1.91) [6.35, 6.69]	6.47 (1.78) [6.31,6.63]	7.08 (2.47) [6.86,7.30]	0.155
Rainy	7.27 (2.32) [7.07, 7.47]	6.83 (2.58) [6.60,7.06]	7.16 (2.25) [6.96,7.36]	0.095
Surgery-related Anxiety Score				
Season				
Winter	8.49 (1.30) [8.38, 8.60]	9.00 (1.09) [8.90,9.10]	8.77 (2.59) [8.54,9.00]	<0.001
Spring	8.23 (1.48) [8.10, 8.36]	8.79 (1.57) [8.65,8.93]	7.32 (2.91) [7.06,7.58]	<0.001
Summer	8.57 (1.29) [8.46, 8.68]	9.08 (1.00) [8.99,9.17]	8.59 (2.82) [8.34,8.84]	<0.001
Rainy	7.22 (1.41) [7.10, 7.34]	7.41 (1.62) [7.27,7.55]	7.04 (1.84) [6.88,7.20]	0.018
Need for Information Score				
Season				
Winter	5.49 (2.05) [5.31, 5.67]	5.59 (1.75) [5.44,5.74]	6.10 (2.22) [5.90,6.30]	<0.001
Spring	7.22(1.80) [7.06, 7.38]	7.48 (1.69) [7.33,7.63]	6.97 (2.69) [6.73,7.21]	<0.001
Summer	5.97 (2.02) [5.79, 6.15]	5.72 (1.75) [5.57,5.87]	6.20 (2.32) [6.00,6.40]	0.605
Rainy	7.30(1.51) [7.17, 7.43]	7.46 (1.50) [7.33,7.59]	7.22 (1.79) [7.06,7.38]	0.024
Education				
Illiterate	5.75 (2.08) [5.57, 5.93]	6.00 (1.83) [5.84,6.16]	6.28 (2.22) [6.08,6.48]	0.037
Matric	6.46 (1.94) [6.29, 6.63]	6.37 (1.91) [6.20,6.54]	6.59 (2.48) [6.37,6.81]	<0.001
Inter	6.68 (2.02) [6.50, 6.86]	6.58 (1.95) [6.41,6.75]	6.56 (2.40) [6.35,6.77]	0.608
Graduate	6.75(1.95) [6.58, 6.92]	6.75 (1.82) [6.59,6.91]	6.86 (2.04) [6.68,7.04]	0.924
Post Grad	7.23 (2.52) [7.01, 7.45]	6.69 (2.32) [6.49,6.89]	7.31 (1.75) [7.16,7.46]	
Area				
Rural	6.47 (1.99) [6.30, 6.64]	6.52 (1.88) [6.35,6.69]	6.49 (2.39) [6.28,6.70]	0.044
Urban	6.27 (2.10) [6.09, 6.45]	6.76 (1.97) [6.59,6.93]	7.20 (1.88) [7.03,7.37]	0.007
Internet Access				
Yes	6.77 (1.99) [6.60, 6.94]	6.77 (1.89) [6.60,6.94]	7.00 (1.93) [6.83,7.17]	0.039
No	6.40 (2.01) [6.22, 6.58]	6.49 (1.90) [6.32,6.66]	6.48 (2.43) [6.27,6.69]	0.001

Season of surgery (winter—1st December to 31st January, spring—1st February to 31st March, summer—1st April to 31st May, and rainy—1st June to 31st July). T1—the evening before surgery, T2—preoperative holding area, and T3—after the child was transferred inside the operation room for surgery.

(STAI) is the most widely used tool to measure anxiety, we applied the Amsterdam Preoperative Anxiety and Information Scale (APAIS), which was developed particularly for the preoperative patient.⁶ APAIS has the advantage of being quick to perform and easy to understand.

Our study highlights the gender disparity in education status among parents of children posted for surgery, which was significantly better among male parents compared to the female parents, which is further reflected in their access to the Internet.^{7,8} Parents displayed higher levels of anxiety related to surgery compared to anesthesia. Our study confirmed that parents' anxiety is more strongly tied to the surgery itself than to anesthesia. This is likely because surgery is the tangible, primary event - the 'procedure' - while anesthesia is often perceived as a secondary service. Parents may have a foundational understanding of what surgery entails but possess significant knowledge gaps regarding the anesthesiologist's role, safety protocols, and postoperative pain management.⁹

Comparing the anxiety due to surgery across different time points during the patient's course of treatment in the hospital, higher anxiety scores were observed before the child was shifted to the operating room. This can be ascribed to increased patient anxiety before entering the unfamiliar operating room environment, which leads to an increase in parents' anxiety levels. These findings are consistent with Pomicino *et al*, who stated that parents who believed that they had not received enough information about pain before and after surgery, had an increased risk of developing anxiety symptoms before surgery.¹⁰

The anesthesia-related anxiety, as well as total anxiety scores, were similar across all time points. The role of pre-anesthetic counselling as is routinely done at our centre in the preanesthesia evaluation clinic, can be the reason for decreased anxiety-related to anesthesia in our participants, which has been corroborated by previous studies reaffirming that handing out more information on the risks of anesthesia to parents in

an understandable mode does not increase anxiety.^{11,12} Seasonal variation showed the highest total anxiety during summer and the lowest scores during the spring season. These findings are consistent with Bulbena *et al*, who have indicated that non-panic anxiety (as seen in parents of pediatric patients) is seen more during the summer and autumn seasons.^{5,13} The authors Howarth *et al* observed that anxiety decreased when the number of hours of sunshine and temperature increased, conversely, anxiety increased with rain or snow.¹⁴

On the other hand, the surgery-related anxiety score decreased during summer and was significantly higher in winter. This can be explained by the increased incidence of viral infections (especially upper respiratory tract infections) in children during the winter season, making parents more apprehensive about their wards' perioperative course.¹⁵ Seasonal variations are associated with a change in the length of daytime, whereby influences sleep quality, mood, and social behavior. There is a paucity of data correlating this with perioperative parental anxiety and it warrants more research to look for a true relationship between these factors.¹⁶

Several changes due to weather fluctuations have been studied regarding population health. These can have a direct impact due to increasing temperature or weather variability, or can be mediated by indirect mechanisms, like the increase in infectious agent presence or via ecological disruption. Extremes of temperatures, both hot and cold weather, is associated with increased morbidity and mortality. Similarly, it has been observed that the population in their extremes of age, such as the pediatric population and the elderly with impaired mobility, and persons suffering from cardiovascular diseases, are disproportionately affected because of their limited physiological capacity to adapt.¹⁷

In present study, parents' educational status and areas of living have been significantly associated with increased anxiety about their child's anesthesia and surgery, since less educated people have limited information and understanding about anesthesia and surgery, and it makes them feel anxious and emotionally strained.¹² Those parents living in rural areas experience higher anxiety. These findings were observed in other studies as well.¹⁸⁻²⁰ The need for information was less in parents who had Internet access compared to those not have access to the Internet. Multiple studies have stated that with more knowledge regarding surgery and anesthesia, parents will be more relaxed and understanding and therefore display less anxiety.^{21,22} Our study observed that parents with internet access reported a lower need for information on the APAIS scale. This suggests they arrived at the preoperative consultation having already acquired information, feeling more prepared, and thus less anxious about unknown factors.

There are a few limitations of our study. Firstly, the findings of our study are from a single center; therefore, multicentric studies with large sample size are needed to confirm our findings. We did not perform a multivariate analysis to account for the interactions between the various factors studied. Thus, the uncorrected *p*-values should be interpreted as indicators of association underscoring the need for replication

in future studies specifically powered for these comparisons. The strength of our study is that we also studied the differences that changes in season bring to the anxiety level of parents of pediatric patients. The lack of epidemiologic studies correlating weather changes and its psychosocial impact on the population of the Indian subcontinent needs to be explored. We asked the patients' parents about their anesthesia-related concerns and we underlined the association between anesthesia and surgery-related concerns and APAIS.

In conclusion, parental anxiety is multifactorial. Alongside addressing well-documented factors like education and information access, our findings highlight the previously understudied role of seasonal variation. Recognizing and addressing these seasonal patterns, alongside other factors, can be crucial for improving parental satisfaction and potentially enhancing patient outcomes.

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DECLARAÇÃO DE CONTRIBUIÇÃO / CONTRIBUTORSHIP STATEMENT

RR: Investigação, Recolha de dados, Redação, Revisão e Edição.

PKD: Conceptualização, Metodologia, Validação, Escrita - Rascunho Original, Visualização, Supervisão.

SS e AK: Recolha de dados, Visualização, Escrita, Revisão e Edição.

RR: Investigation, Data curation, Writing-review and Editing.

PKD: Conceptualization, Methodology, Validation, Writing-original draft, Visualisation, Supervision.

SS and AK: Data curation, Visualisation, Writing-review and Editing.

Responsabilidades Éticas

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Proteção de Pessoas e Animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pela Comissão de Ética responsável e de acordo com a Declaração de Helsínquia revista em 2024 e da Associação Médica Mundial.

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