

An Experimental Study on Preoperative Inoculation as a Means of Reducing Anxiety in Patients Undergoing Elective Surgery:

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ABSTRACT

Background: The aim of this study is to test the effectiveness of a purely psychological intervention, using video-film referred to in this research as preoperative inoculation in reducing preoperative anxiety in patients undergoing elective surgery.

Method: Sixty participants scheduled to undergo elective surgery were recruited at in six hospitals in North Eastern Nigeria to participate in the study. The patients were divided into experimental and control groups.

Instrument: Amsterdam Preoperative anxiety and Information Scale (APAIS), was used for data collection.

Procedure: patients in both groups were administered APAIS to get their baseline preoperative anxiety scores one day after their recruitment. On the other hand, patients in the experimental group were shown the preoperative inoculation film two days before their surgery. APAIS was re-administered to them a day after watching the film. Participants in the control group were administered APAIS for the second time on the day of their surgery to comparison with their baseline scores.

Results: Data analysis was performed using SPSS. At baseline, both groups presented with high preoperative anxiety ($M=15.01$, $SD=1.26$ [95% CI 14.7 to 15.3]) for experimental group and ($M=14.59$, $SD=1.23$ [95% CI 14.3 to 14.9]) for control group. Patients in the experimental group shows significant decrease in anxiety after comparing their baseline APAIS scores ($M=15.01$, $SD=1.26$ [95% CI 14.7 to 15.3]) with their scores after watching the inoculation video ($M=11.05$, $SD=1.12$ [95% CI 13.7 to 15.2]). Finally, patients in the experimental group who watched the preoperative inoculation video presented with low anxiety scores ($M=10.87$, $SD=1.30$ [95% CI 10.4 to 11.3]) compared to control group's scores measured just before the surgery ($M=17$, $SD 1.19$ [95% CI 16.6 to 17.4]). **Conclusion:** the use of preoperative inoculation film has been found to be effective in reducing preoperative anxiety in patients undergoing elective surgery particularly in hospitals with limited manpower in the preoperative assessment clinics to provide the routine psychological services for allaying preoperative anxiety.

KEYWORDS: preoperative, inoculation, anxiety, elective, surgery.

I. INTRODUCTION:

Anxiety is an inordinate, incapacitating level of tension, apprehension, dread and nervousness disproportionate to the level of threat that causes it. Anxiety affects people in different ways: Physiologically, anxiety causes physiological reactions including abnormal heart rate and hyperventilation, nausea and vomiting, sweating and body tremors. Psychologically, anxiety induces apprehension, uneasiness, restlessness, and abnormal thinking [1]. Behaviorally, the effects of anxiety includes failure to handle everyday hurdles and inability to plan a course of action [2]. Patients undergoing surgical operation are affected by a considerable degree of anxiety known as pre-operative anxiety. Pre-operative anxiety is described as an unbearable state of nervousness, apprehension, and tension [3-5]. Some studies have estimated that the prevalence of preoperative anxiety ranges between 11-80% of surgical patients [6, 7]. Many researchers have reported different causes of pre-operative anxiety among surgical patients. Negative expectations of what may happen intra-operatively or postoperatively, and the fear of pain, body mutilation, loss of control and independence are documented causes of pre-operative anxiety [8, 9]. Other causes of pre-operative anxiety are signs of underlying diseases such as diabetes and hypertension, information from family members and friends, and experience of anaesthesia and the surgery itself [10, 11]. Dagona [12] reported that pre-operative anxiety results from many factors including waiting for the surgery, anticipation of postoperative pain, fear of the surgery and post-operative complications. According to [4, 8], pre-operative anxiety increases the experience of postoperative pain; causes variability in patients' vital signs, affects the functions of the immune system thereby causing delays in surgical wound healing.

The combined effects of all these could lead to postponement of the surgery, prolonged hospital stays, and consumption of higher doses of analgesics postoperatively [10]. Similarly, Singh [13] reported that pre-operative anxiety response to anaesthesia and surgery increases the release of catecholamine, resulting in physical changes such as increased heart rate, constriction of blood vessels, hyperventilation and blood clotting with fast coagulation. Catecholamine is released to prepare the body for 'flight or fight' in response to a physical threat. A higher release of catecholamine causes medical problems like muscle tremors, diabetes, heart attack and stroke. Higher catecholamine in the body decreases the functions of the immune system, causing susceptibility to postoperative opportunistic infections and prolonged surgical wound healing. Physical problems such as headache, dry mouth, flushing and nausea among surgical patients are symptoms commonly caused by pre-operative anxiety. Pre-operative anxiety has also been found to cause dizziness.

There are several ways through which preoperative anxiety is reduced. Studies have shown that, preoperative anxiety is mostly reduced via drug therapy such as Gabapentin Tirault, Foucan [14], Midazolam, Chen, Wang [15], Lorazepam, Maurice-Szamburski, Auquier [16] etc, to sedate and anaesthetise the patients. Drug therapy, though very effective in reducing preoperative anxiety, has been found to affect the body systems of the patients; it induces postoperative nausea and vomiting, drowsiness thereby delaying the discharge of the patient from the hospital, consequently increasing their cost of medication Tirault, Foucan [14]. To reduce such effects on patients, non-pharmacological approaches have been developed to reduce surgical patients' preoperative anxiety. Guo, East [17] reported that the use of written educational materials is very effective in providing information to surgical patients leading to reduction of preoperative anxiety. Patient information and education involves providing relevant health-related information by healthcare professionals with the aim of influencing and altering the patients' perceptions of health services, changing their behaviours and improving their health. For patients waiting for elective surgery, this type of education is also termed psycho-educational preparation [18]. According to Mitchell (2005) providing the appropriate and required information is the most essential aspect of psycho-educational therapy prior to elective surgery.

Provision of adequate and desired information leads patients to develop good coping strategies and increases their self-efficacy. This method however have limitations as some patients are uneducated visually impaired or has some disabilities preventing them from reading materials. The use of music therapy to reduce pre-operative anxiety is receiving greater attention [19] and have been recognised as effective among other non-pharmacological preoperative anxiety reduction interventions [20] According to Weeks and Nilsson [21] music intervention brought significant reduction in the level of experimental (music group's) anxiety and improved their wellbeing postoperatively. Other non-pharmacological Intervention for reducing preoperative anxiety includes the use hypnosis and suggestions (Schnur, Bovbjerg [22]; Abdesahi, Hashemipour [23] and the use of video-film and multimedia information. According to [24] Preoperative multimedia information reduces the anxiety of patients undergoing surgery under regional anaesthesia. This type of information is easily delivered and can benefit many patients. More so, [25] tested the effects of video information on outcome in patients undergoing angiography. The findings reveal that the patients in the experimental group presented with a statistically significant reduction in the heart rate and blood pressure after the intervention compared to the patients in the control group. The patients in the experimental group had considerably higher levels of comfort, satisfaction, and tolerability than the control group. In another study, [26] found that video education were equally effective in reducing angiography-related patient anxiety and recommended such intervention to reduce anxiety amongst patients undergoing coronary angiography in Iranian hospitals. Other studies by [27, 28], reported that use of the informative video reducing anxiety proves to be highly efficient and recommended it as an alternative way to lower anxiety levels and to significantly increase the level of satisfaction. Given the beneficial effects of video-film in reducing preoperative anxiety, an approach that has the advantage of solving the problems of shortage of staff to provide preoperative preparation in patients undergoing elective surgery where such staff are inadequate, the present study therefore is designed to test the effects of preoperative video-film termed 'preoperative inoculation' to reduce pre-surgical anxiety in patients undergoing elective surgery in Nigerian hospitals.

Rationale for the study : Considering pre-operative anxiety as a serious problem affecting surgical patients, healthcare providers try to reduce it; otherwise, it will be difficult for surgeons to operate on highly anxious surgical patients. In most African countries, including Nigeria, there is acute shortage of surgical staff and equipment. This poses a significant challenge to highly anxious surgical patients in terms of receiving the best surgical care. Also, the Conventional way of treating preoperative anxiety in most Nigerian health facilities is the use of drug therapy to sedate and anaesthetise the patients. This approach though very effective, has been found to induce postoperative nausea and vomiting, delay the discharge of the patient from the hospital thereby increasing their cost of medication. Devising a psychological intervention using a video-film to treat

preoperative anxiety will solve the problems of shortage of hospital staff to provide preoperative preparation to patients undergoing elective surgery. This study therefore is designed to test the effects of preoperative video-film intervention termed 'preoperative inoculation' to reduce pre-surgical anxiety in patients undergoing elective surgery.

Objective of the study : The objective of this study is to test the effectiveness of a purely psychological intervention (called 'preoperative inoculation' In the context of this research) in reducing preoperative anxiety in patients undergoing elective surgery.

Hypothesis

- At baseline, there may not be significant difference in preoperative anxiety scores of patients in both experimental and control group.
- There may be significant difference in preoperative anxiety scores of patients in the experimental group after comparing their scores before and after watching the preoperative inoculation video film.
- Patients in the control group are likely to present with higher levels of anxiety compared to patients in the experimental group who watched the preoperative inoculation film.

II. METHOD:

Study Area: The study was conducted in Teaching Hospitals/Federal medical centres in the six states of North Eastern Nigeria (one from each state).

Participants: A convenient sample of 60 surgical patients, consisting of 43 male and 27 female were recruited from either a Teaching Hospital or a Federal Medical Centre in the six states of the North Eastern Nigeria. The patients' age ranges between 17 to 61 years. 38 of the participants are married, 12 single while the remaining 10 are either divorced or separated. Twenty two (22) participants had previous surgical history, 17 had history of hospitalisation but no history of surgical operation.

Instrument:

- (i) Amsterdam Preoperative Anxiety and Information Scale (APAIS)[29] was used as the instrument for data collection. The Amsterdam Pre-operative Anxiety and Information Scale (APAIS) is a short self-reporting measure used to measure pre-operative anxiety in patients undergoing surgical operation. It was developed by [29] out of an understanding that what has been used as the 'gold standard' for measuring pre-operative anxiety, the state-trait anxiety inventory (STAI), is too long, consisting of 42 items that are not related to anxiety specific to surgery. The STAI is therefore not a suitable scale for use in a crowded outpatient setting or on pre-operative patients. APAIS consists of six questions designed to gather information about fear of surgery, fear of anaesthesia and the need for information. Items 1, 2, 4 and 5 gather information on fear of surgery while items 3 and 6 collect information on the patient's desire for information. Scoring is done on a 5 point Likert scale, ranging from 1 (Not at all), to 5 (Extremely). The four anxiety items consist of two sub-scales – that is, the anxiety related to anaesthesia sub-scale (Sum A), which is obtained by adding the patient's scores on items 1 and 2, and the anxiety related to surgery sub-scale (Sum S), obtained by adding scores on items 4 and 5. The third component measures the patient's desire for information. This component is obtained by adding the patient's scores for items 3 and 6. Overall, each participant's cumulative anxiety score (Sum C) is obtained by adding the scores of Sum A + Sum S. The highest score for the anxiety sub-scale = 20. On the information desire sub-scale, a patient with the highest score would have 10 points. The instrument has been validated and found to be a reliable measure of preoperative anxiety. Moerman, van Dam [29] performed several statistical analyses to calculate the validity of the instrument. Factor analysis was used to establish construct validity. Concurrent validity was established by correlating the APAIS with the state version of Spielberger's State-Trait Anxiety Inventory (STAI), which was considered the gold standard for measuring preoperative anxiety [29, 30]. It was hypothesised that significant correlation (>.60) between the state scale of the STAI and the anxiety sub-scale of the APAIS would exist, and that there would be a lower correlation (>.30) with the desire for information sub-scale of the APAIS. The internal consistencies of both scales were also found to be sufficient for group comparison. In this study, only items related to preoperative anxiety (items 1,2,4 and 5) will be used as the focus of the research is on preoperative anxiety and not patients desire for information.

Data collection Procedure: After obtaining written informed consent from the participants, they were randomly assigned into two groups (experimental [video group] and control [no video group]) All participants have been administered the instrument-APAIS in the morning of the day preceding their scheduled surgery. The records of their physiological parameters of anxiety (blood pressure, pulse and heart rate) were also taken. This formed the participants' baseline data depicting their levels of preoperative anxiety. In the evening preceding their surgery, an 11 minutes video-film of a healthy person who acted as a surgical patient, who went through all the processes of surgical operation (from medical examination through the surgical operation up to the point of discharge) was shown to the patients in the experimental group. The aim is for the participants in the experimental group to see all the processes they are about to undergo. The idea is that, because the patient in the video has undergone surgical operation, recovered and was finally seen in the video being discharged, looking very happy, with no sign of anxiety and distress, the patients in the experimental group are likely to identify with the patient in the video and therefore likely to have their preoperative anxiety reduced. After watching the video, the participants in the experimental group were administered the instrument – APAIS for the second time. Also the records of their heart rate and blood pressure were taken for the second time. Participants in the experimental group were also administered the instrument –APAIS and their heart rate, blood pressure and pulse rate were taken for the second time even though they were not shown the video.

III. RESULTS

Baseline preoperative anxiety data : Although APAIS has two separate sub-scales (anxiety and need for information) sub-scales; in the current study, data was collected only on the preoperative anxiety sub-scale. That is, only responses on items 1,2,4,5 were analysed. Moerman, van Dam [29] recommended a score of 13 on the anxiety sub-scale to be used for research purpose where anxiety reduction is an important outcome for reason that at score of 13, there were hardly false positives and therefore the database is less polluted. Using this as level of analysis, the findings reveals that at baseline, 47(78%) of the research participants presented with moderate to high preoperative anxiety. Of this number, 28 (59%) participants had between 15-18 scores on the preoperative anxiety sub-scale and were classified as high anxiety cases, while the remaining 19(41%) participants, were classified as moderate anxiety cases at baseline. On the other hand, 23 (22%) participants whose anxiety scales scores was less than 13 were classified as less anxiety cases at baseline (figure 1).

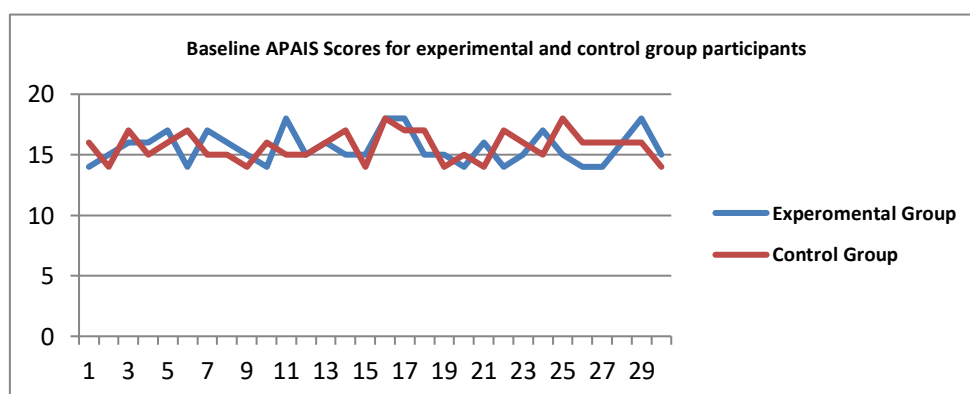


Figure 1 presents participants baseline APAIS scores.

Hypothesis testing:

a) To test the hypothesis that at baseline, there may not be significant difference in APAIS (preoperative anxiety) scores of patients in experimental and control group. Independent t-test was computed. The result for the 60 participants shows that at baseline there was no significant difference in the preoperative anxiety scores for participants in the control group ($M=15.01$, $SD=1.26$ [95% CI 14.7 to 15.3]) and ($M=14.59$, $SD=1.23$ [95% CI 14.3 to 14.9]) experimental group $t(58), 2.89$; $p = 0.05$. These results suggest that at baseline, patients in both groups presented with similar levels of preoperative anxiety. Specifically, the results suggest that when patients are about to undergo surgical operation, they all present with some degree of preoperative anxiety.

Figure 1 presents baseline information for the participants in experimental and control groups

b) Hypothesis 2 compared the baseline APAIS scores of patients in the experimental with their scores after watching the preoperative inoculation film. To test this hypothesis, a paired t-test was computed and the results shows a significant difference in scores from baseline ($M=15.01$, $SD=1.26$ [95% CI 14.7 to 15.3]) and

post intervention (after watching the preoperative inoculation video)($M=11.05, SD=1.12$ [95% CI 13.7 to 15.2]) This indicates that preoperative inoculation video resulted in decrease in preoperative anxiety in patients scheduled to undergo elective surgery ($t(29)=4.13, P=0.05$)

Figure 2 presents Experimental Group participants' Baseline APAIS Scores VS their Scores after watching the Inoculation Video

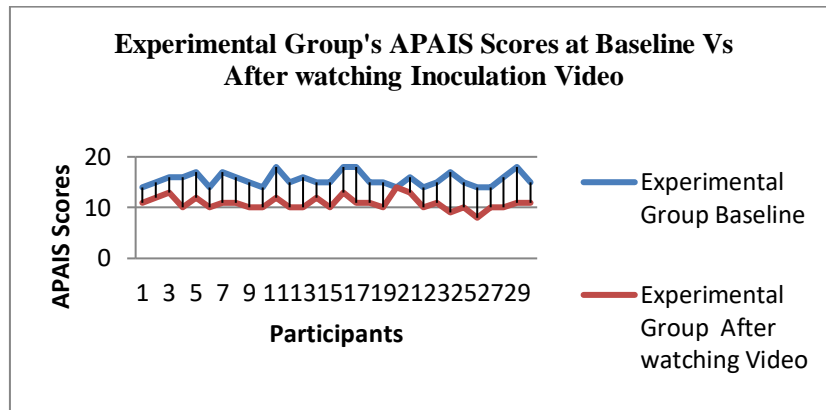
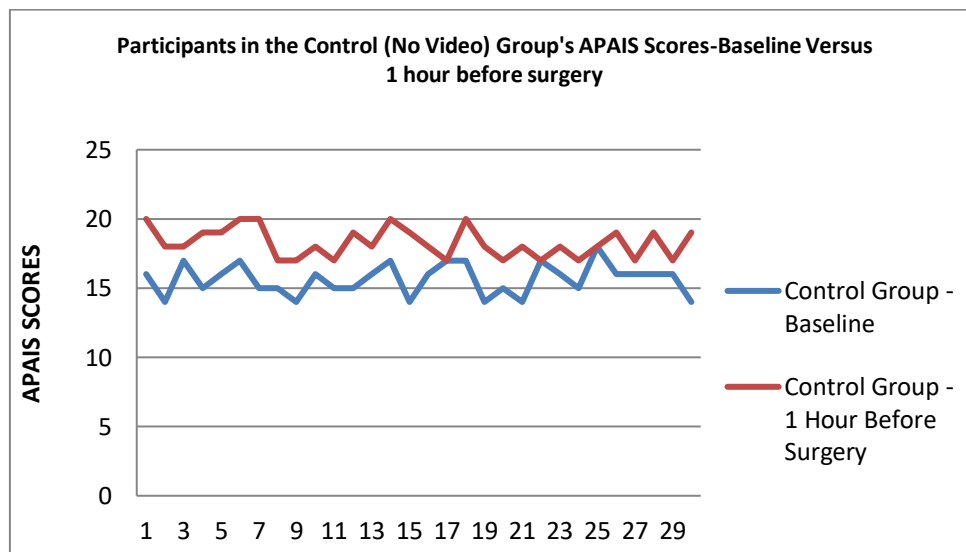


Figure II: presents experimental group participants' baseline and post intervention APAIS scores

- c) Hypothesis 3 states that, patients in the control group are likely to present with higher levels of anxiety compared to patients in the experimental group who watched the preoperative inoculation film. To test this, another independent t-test was computed using the control group's APAIS data measured just before the operation and the one measured after for the experimental group after watching the preoperative inoculation video. The result shows that there is a significant difference in preoperative anxiety in the two groups of the participants. The 30 participants who watched the preoperative inoculation video presented with low anxiety scores ($M=10.87, SD=1.30$ [95% CI 10.4 to 11.3]) compared to control group's scores measured just before the surgery who presented with significantly high anxiety scores, ($M=17, SD 1.19$ [95% CI 16.6 to 17.4]), fig.3. To further test statistical significance of the two group's scores, independent t test was computed and the result shows a statistically significant difference between groups ($t(58)=1.04, p=0.05$).

Figure 3 presents information on control groups APAIS scores at baseline Vs. 1 hour before the surgery



IV. DISCUSSION

This study aimed at testing the effectiveness of a purely psychological intervention (called 'preoperative inoculation' in the context of this study) in reducing preoperative anxiety in patients undergoing elective

surgery. The result of the study suggests that at baseline, patients in both experimental and control groups presented with similar levels of preoperative anxiety. Specifically, the results suggest that when patients are about to undergo surgical operation, they all present with some degree of preoperative anxiety. A striking result of this study shows that after the intervention (watching the preoperative inoculation video film), 78 per cent of the patients in the experimental group had significantly reduced anxiety compared to their baseline scores as indicated by the paired t-test result $t(29) = 4.13, P = 0.05$. This finding is similar with the results of a randomised controlled trial (RCT) by Jjala, French [24] who tested the effects of multimedia information on pre-operative anxiety in 110 patients undergoing upper and lower limb procedures under regional anaesthesia. In Jjala's study, patients in the experimental group were exposed to a short video depicting a patient's surgical journey, including the administration of spinal anaesthesia. In patients in the experimental group, anxiety was significantly reduced compared with their initial baseline anxiety scores. Ninety per cent (90%) expressed satisfaction with the film and approximately 70% of the patients in the experimental group reported feeling calm postoperatively. Similarly, in another Randomised Controlled Trial (RCT) Arabul, Kandemir [31] reported a finding consistent with the results of this study.

Patients in the video group appeared to have responded positively to the question demanding them to indicate whether the video provided the desired information, reduced their anxiety, and increased satisfaction and readiness to undergo another procedure in future. Although no question was asked in this study to confirm patients' satisfaction, the fact that preoperative anxiety was significantly reduced in the experimental group participants revealed the efficacy of the inoculation intervention. Wu, Chen [32] investigated the efficacy of an enhanced multimedia educational programme in decreasing pre-operative anxiety and patients' satisfaction with information before cardiac catheterisation. As in this study, the participants in Wu, Chen [32] experienced moderate to low anxiety at baseline before exposure to the intervention. Patients assigned to the accessibility-enhanced multimedia informational education group had significantly lower anxiety and were most satisfied with the materials they received as opposed to patients in the regular routine intervention and the DVD groups. A statistically significant difference in anxiety levels was only found before cardiac catheterisation in all groups of patients. Another finding of the present study revealed that the patients in the control group who haven't had the opportunity to watch the inoculation video film, and were administered APAIS an hour before their surgery had their preoperative anxiety increased compared with their baseline score. This indicates that, normal routine care alone which was received by patients in both experimental and control groups is not sufficient to reduce preoperative anxiety. Contrary to the findings of this study, Momeni et al found that showing a video six days before the surgery is capable of reducing preoperative anxiety in surgical patients, showing the same video one day before the surgery increases anxiety in the same surgical patients. This difference in response to the intervention could be attributed to personality factors, the materials presented in the video and the way the video is presented to the patients. These notwithstanding, video film as an audio-visual material in which the patients watch step-by-step the procedure they are about to undergo, seeing the model in the video being discharged with no sign of distress in him makes the patients undergoing their surgery to identify with the him, consequently have their anxiety reduced.

V. LIMITATIONS OF THE STUDY

This study has a number of limitations. First, the study was conducted with participants undergoing different types of elective surgery with different levels of case complexity which may naturally lead to different levels of preoperative anxiety. The study would have been more robust if patients with similar or same surgical cases were recruited to participate. Despite the difference in case mix and complexities, the preoperative inoculation video proved to be very effective in reducing preoperative anxiety. Second, the assignment of participants to either experimental or control group was done on first-come first-assigned bases. This is due to the fact that not all participants consented to participate in the study when they were approached. More so the study was conducted in different hospitals and data was collected at different times. This makes it difficult to strictly assign randomly the patients to the two groups. Three, the patient seen in the preoperative inoculation video is a male patient; this is seen as a limitation for female patients who would have identified better with a female surgical than modelling a male patient. Despite the above limitations, the study has demonstrated the effectiveness of preoperative inoculation in reducing anxiety in patients scheduled to undergo elective surgery.

VI. RECOMMENDATIONS:

Further research is needed, using large number of participants, more rigorous randomisation and use of participants with similar or the same surgical cases. Male and female models should be used while shooting the preoperative inoculation videos such that female patients will be shown a video with a female model and vice-versa. There is also a need to gather qualitative data via interview from the participants with regards to their

satisfaction with the preoperative inoculation video. Practitioners in the preoperative assessment clinic, other hospital staff responsible for managing and preparing patients before elective surgery should employ the use of video-film intervention in reducing preoperative anxiety before allowing their patients to undergo surgery.

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