

Preoperative Needs-Based Education to Reduce Anxiety, Increase Satisfaction, and Decrease Time Spent in Day Surgery: A Randomized Controlled Trial

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Abstract

Background Too much or too little information during patient education can increase patient anxiety. Needs-based patient education helps to determine the appropriate amount of information required to provide education based on patient needs. This study aimed to compare needs-based patient education with traditional patient education in reducing preoperative anxiety.

Methods This was a prospective, multicenter, single-blind, randomized controlled trial with a 1:1 allocation ratio. Patients undergoing day surgery were randomized into a study group (needs-based education) or a control group (traditional education). The primary outcome was patient anxiety. Secondary outcomes were patient satisfaction and time spent in patient education. Patients completed questionnaires to evaluate their anxiety and satisfaction before patient education, after patient education, and after surgery.

Results In total, 450 patients were randomized and analyzed (study group $n = 225$, control group $n = 225$). Comparisons before education, after education, and after surgery showed that there was a significant decrease in patient anxiety and an increase in satisfaction in both groups ($p < 0.001$). The comparison between needs-based education and traditional education showed a greater decrease in anxiety (7.09 ± 7.02 vs. 5.33 ± 7.70 , $p = 0.001$) and greater increase in satisfaction (21.1 ± 16.0 vs. 16.0 ± 21.6 , $p < 0.001$) in the needs-based group. The needs-based group also had significantly less education time than the traditional group (171.8 ± 87.59 vs. 236.32 ± 101.27 s, $p < 0.001$).

Conclusion Needs-based patient education is more effective in decreasing anxiety, increasing patient satisfaction, and reducing time spent in education compared with traditional patient education.

Trial registration ClinicalTrials.gov, number NCT03003091

Introduction

Preoperative anxiety can compromise surgical outcomes [1]. Anxiety increases serum cortisol, adrenaline, and noradrenaline [2, 3]. This results in postoperative pain, increased postoperative analgesic requirements, prolonged hospital stay, and patient dissatisfaction [4, 5]. However, preoperative anxiety can be reduced [4].

Although patient education is widely used to reduce operative anxiety [4], some patients become more anxious after the education [6–8]. This may be explained by the

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different coping styles individual patients use to deal with their anxiety [9–12]. There are four major coping styles: vigilant, avoidant, fluctuating, and flexible [1, 10–12]. People with a vigilant coping style want extended information to reduce anxiety [1, 11, 12]. Those with an avoidant coping style prefer a minimal amount of information, as too much causes anxiety [1, 11, 12]. People with a fluctuating coping style generally desire a small amount of information but with greater detail in certain areas [11, 12], and those with a flexible coping style are able to adapt to whatever information is available [11]. Therefore, if patient education with extended information is given to people with an avoidant coping style, they will become more anxious [1, 11, 12]. In a previous study, Mitchell (11) found that 31% of surgical patients in the study population had an avoidant coping style [11]. This was supported by Gillies and Baldwin [8], who found that one-third of patients reported being worried after receiving an informative booklet. Thus, patient education with different levels of information that reflects patients' differing needs should be developed to respond to all types of coping styles [1, 10, 11].

Needs-based patient education is promising, and there is an increasing amount of supporting literature [13, 14]. It involves a process in which patient needs for information are assessed prior to providing education. It is based on the principle of shared decision-making, which is central to patient-centered care [15]. Needs-based education is also consistent with adult learning theory, in which learning should be matched to different individual backgrounds and needs [16]. A randomized controlled trial conducted to compare needs-based education with traditional education in patients with rheumatoid arthritis found that needs-based education was superior [14]. However, evidence for using needs-based education in surgery remains little and suggestive [17, 18].

This study evaluated the effect of needs-based education in reducing preoperative anxiety, using a questionnaire to assess patient needs. After receiving a completed questionnaire, the physician provides information based on patients' identified needs. Both patients and physicians can benefit from this process [14]. The questionnaire enables physicians to cut unnecessary information and pay more attention to the facts that patients need. Less information needed results in less time spent in patient education sessions. This is particularly important, as the most common reason for omitting patient education is shortness of time [19]. Needs-based education can contribute significantly to the way we educate surgical patients.

Objectives

This study aimed to compare needs-based education with traditional education in terms of how they affected preoperative anxiety, patient satisfaction, and time spent in education.

Methods

Trial design

This was a prospective, multicenter, randomized controlled trial. The allocation ratio was 1:1. The study was conducted and data were analyzed in accordance with the Consolidated Standards of Reporting Trials statement [20]. The study protocol was reviewed and approved by appropriate ethics committees. This trial was registered at ClinicalTrials.gov, number NCT03003091.

Participants

Inclusion criteria were patients aged 18 years or older who were scheduled for excision of benign mass and were willing to cooperate with the study. Excision was chosen because it was one of the most common basic procedures in day surgery. Exclusion criteria were patients who were illiterate and could not answer the questionnaire by themselves, those with psychiatric disorders, those who underwent surgery within the previous 6 months, and those with the possibility of undergoing a major operation after day surgery. After patients agreed to participate, the study protocol was explained by the investigators. Written informed consent was obtained from all participants.

The study was conducted in three hospitals in different regions in Thailand: Chulabhorn Hospital in Bangkok, Mae Fah Luang University Hospital in Chiang Rai, and Ratchaburi Hospital in Ratchaburi.

Interventions

Patient education occurred before informed consent process in this study. Participants were randomized in two groups: a control group and a study group. As most hospitals provided verbal and written information during patient education, the control group was set to represent this method of teaching and was defined as traditional education. All detailed information was provided to participants in this group. On the other hand, the study group received needs-based education. Participants also received verbal and written information to control the mode of information delivery, but the major difference was amount of information provided to participants. These participants

first received a self-administered questionnaire in which they could choose how much information they would like to know in each topic (Fig. 1). After completing the questionnaire, participants submitted the questionnaire to their physicians (investigators). The physician then provided patient education based on participants' identified needs. For examples, the study group could choose 'concise' in disease information and received name and

characteristics of disease, while the control group had to receive all information in 'detailed,' including name, characteristics, causes, and possibility of recurrence. Other examples in every topic are illustrated in Fig. 1. Therefore, the study group received part or all of the information that the control group received. It was emphasized to all participants in the study group that complications were the

Instructions

Too much or too little information may increase patient anxiety during patient education. This questionnaire is designed to assess your preferred amount of information for each topic. Please select whichever amount of information you prefer. Your answers will not affect any treatment you will receive.

Please ✓ the amount of information you prefer to receive.

Topics	Preferred Amount of Information		
	None	Concise	Detailed
1. Disease information	<input type="radio"/>	<input type="radio"/> e.g., name, characteristics	<input type="radio"/> e.g., name, characteristics, causes, possibility of recurrence
2. Procedural detail	<input type="radio"/>	<input type="radio"/> e.g., inject anesthesia, incise, and take the mass out	<input type="radio"/> e.g., apply antiseptic solution and drapes, inject anesthesia, use scalpel to incise, take the mass out, stop bleeding, and stitch to close wound
3. Complications	Receiving this information is mandatory	<input type="radio"/> e.g., hematoma, wound dehiscence, wound infection	<input type="radio"/> e.g., hematoma, wound dehiscence, wound infection, and how to solve these problems
4. Patient behavior (What should I do?)	<input type="radio"/>	<input type="radio"/> 1. Before operation - take & don't take drugs 2. During operation - say when getting hurt after local anesthesia, but don't withdraw from pain 3. After operation - wound care: keep wound clean and dry, clean wound daily - remove stitches in 7 days - omit heavy exercise in first week	<input type="radio"/> 1. Before operation - eat meals - take & don't take drugs 2. During operation - lie down and be relaxed - say when getting hurt after local anesthesia, but don't withdraw from pain 3. After operation - wound care: keep wound clean and dry, clean wound daily - remove stitches in 7 days - wound might get swelling and red in 1-2 weeks and will slowly subside in 1-2 years - eat high protein and drink adequate water (2 Liters/day) - omit raw food or bad food hygiene - omit heavy exercise in first week - wound achieves its maximal strength in 2 months
5. Pain	<input type="radio"/>	<input type="radio"/> e.g., duration	<input type="radio"/> e.g., duration, level, when to take anesthesia

Fig. 1 Needs-based patient education questionnaire

only topic they had to be informed due to ethical issue and the choice, ‘none,’ was not available (Fig. 1).

Questionnaire development

The needs-based patient education questionnaire was developed based on previous literature, patient interviews, and expert consultation [1, 10, 12, 21]. With the aim of reducing anxiety, information was classified into five main topics: disease information, procedural detail, complications, patient behavior, and pain [1, 12]. Interviews were conducted with 30 patients to determine what they wanted to know about these five topics. The results were summarized to make a structured script of preoperative patient education. The questionnaire was developed based on the structured script and allowed responders to choose how much information they wanted about each topic: none, concise, or detailed (Fig. 1). The questionnaire was piloted and validated with 20 patients.

To standardize all educators, a structured script was used to ensure the same amount of information was delivered to patients. A video recording was used during standardization to control similarity of educator speaking speed, intonation, manner, and movement.

Outcomes

The primary outcome was patient anxiety. This was assessed with the Spielberger State-Trait Anxiety Inventory (STAI form Y-1: state anxiety) and a 100-mm visual analogue scale (VAS) for anxiety [22, 23]. The STAI was designed to assess an individual’s momentary or situational anxiety. It comprises 20 questions, each with four response options, producing a score between 20 and 80. A higher score indicates higher anxiety.

Secondary outcomes were patient satisfaction and time spent in patient education. Patient satisfaction was measured with a 100-mm visual analogue scale [24]. Time spent in patient education was recorded with a stopwatch from the beginning to the end of the patient education session. Time to complete questionnaire and greeting conversation was not recorded to reduce possible confounding factors.

Questionnaires were provided to participants to assess outcomes before patient education, after patient education, and after their surgery. To ensure that the presence of the educator did not affect participants’ opinions, they were told that their opinion would be anonymous and would not be revealed to their educator. They also completed the STAI questionnaire privately in a separate room from their educator. Completed questionnaires were submitted for data analysis anonymously.

Sample size

A pilot study was conducted with 30 patients. The decrease in STAI after patient education was 6.53 ± 6.63 and 4.40 ± 8.93 for a study group and a control group, respectively. With a 95% CI and power of 80%, the calculated sample size was 215 participants in each study arm. None of the pilot study results were included in the final study sample.

Randomization

The investigators enrolled participants. They generated simple randomization by tossing a coin and allocating the participant in a 1:1 ratio to either the study group or the control group. The investigator, who enrolled participants and obtained informed consent, was also the person who provided patient education.

Blinding

Participants were blinded to the nature of the intervention (needs-based or traditional patient education). During the informed consent process, all participants were informed about the purpose of the study and the need to complete questionnaires to assess anxiety and satisfaction. Participants did not know which group they were in and did not know that there was an additional questionnaire for the needs-based patient education group. However, the physicians who provided patient education were not blinded.

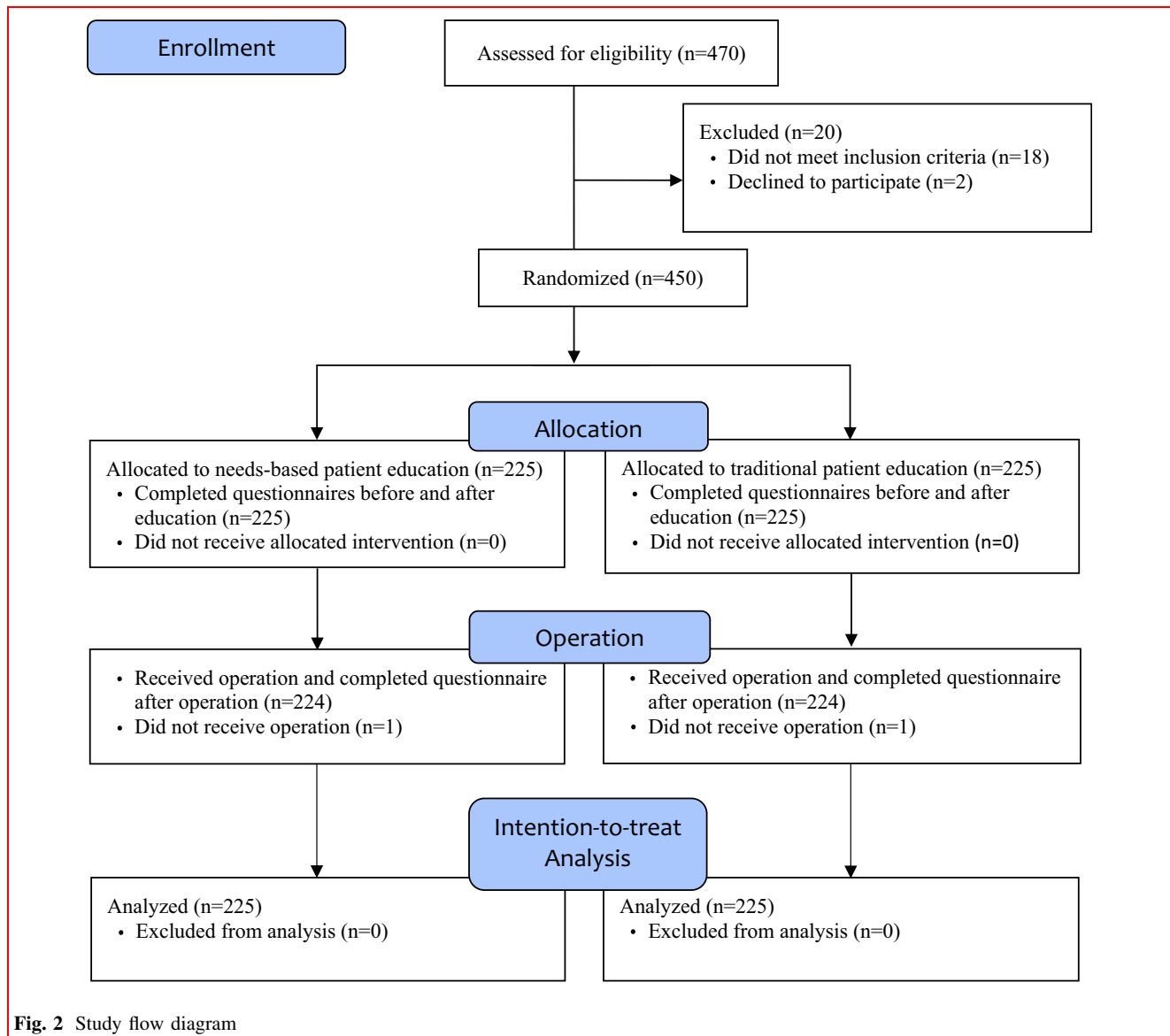
Statistical analysis

Data were analyzed on an intention-to-treat basis. STATA/SE version 12.1 was used for the analyses. Data were reported as mean and standard deviation for all continuous variables and as number (percentage) for discrete variables. For nonparametric data, differences between groups were analyzed by Mann–Whitney *U* tests. Pearson’s χ^2 and Fisher’s exact tests were used to compare discrete variables. A test for trend across ordered groups was used to analyze the evolution of scores before education, after education, and after surgery. A *p* value <0.05 was considered statistically significant.

Results

Participants and recruitment

The study flow diagram is shown in Fig. 2. Patients were recruited over a 6-month period, from April to September,



2016. There were 225 participants in each group included in the intention-to-treat analysis.

Baseline data

There were no significant differences in demographic data and clinical characteristics between the two groups (Table 1). In addition, there were no significant differences in the operations participants received. The two groups shared indifference in their baseline anxiety [STAI forms Y-1 and Y-2 (trait anxiety), and VAS] and satisfaction, as shown in Table 2.

Outcomes

The comparisons of questionnaire results before education, after education, and after surgery showed a significant decrease in patient anxiety and increase in satisfaction in both groups. Across the three time points, the needs-based group had decreased anxiety (STAI Y-1: 46.10 ± 8.50 , 39.01 ± 10.26 , 34.54 ± 9.99 , $p < 0.001$; VAS: 67.4 ± 20.5 , 28.5 ± 27.2 , 17.6 ± 23.9 , $p < 0.001$) and increased satisfaction (70.8 ± 20.7 , 91.9 ± 12.2 , 94.0 ± 11.2 , $p < 0.001$). The traditional group also showed decreased anxiety (STAI Y-1: 46.96 ± 8.91 , 41.64 ± 9.78 , 37.02 ± 10.34 , $p < 0.001$; VAS: 66.0 ± 25.7 , 41.0 ± 27.1 , 29.4 ± 22.2 , $p < 0.001$) and increased satisfaction (70.5 ± 21.2 , 86.5 ± 15.8 , 90.0 ± 9.1 , $p < 0.001$) over the three time points.

Table 1 Demographic data: Data are presented as number (percentage) or mean \pm SD

Demographic data	Needs-based education	Traditional education	<i>p</i> value
1. Age (years)	32.36 \pm 15.19	31.86 \pm 15.48	0.985
2. Sex			0.448
Male	95 (42.2)	103 (45.8)	
Female	130 (57.8)	122 (54.2)	
3. BMI	23.21 \pm 4.49	23.35 \pm 4.25	0.405
4. Education			0.876
Primary	16 (7.1)	15 (6.7)	
Secondary	61 (27.1)	59 (26.2)	
Undergraduate	135 (60.0)	145 (64.4)	
Graduate	13 (5.8)	6 (2.7)	
5. Trait anxiety (STAI Y-2)	45.01 \pm 8.32	45.58 \pm 7.69	0.420

BMI body mass index, *SD* standard deviation, *STAI* State-Trait Anxiety Inventory

Table 2 Summary of results: Data are shown as mean \pm SD

Results	Needs-based education	Traditional education	<i>p</i> value
Before education			
State anxiety (STAI Y-1)	46.10 \pm 8.50	46.96 \pm 8.91	0.369
Anxiety (VAS)	67.4 \pm 20.5	66.0 \pm 25.7	0.912
Satisfaction	70.8 \pm 20.7	70.5 \pm 21.2	0.355
After education			
State anxiety (STAI Y-1)	39.01 \pm 10.26	41.64 \pm 9.78	0.030
Anxiety (VAS)	28.5 \pm 27.2	41.0 \pm 27.1	<0.001
Satisfaction	91.9 \pm 12.2	86.5 \pm 15.8	<0.001
After operation			
State anxiety (STAI Y-1)	34.54 \pm 9.99	37.02 \pm 10.34	0.037
Anxiety (VAS)	17.6 \pm 23.9	29.4 \pm 22.2	<0.001
Satisfaction	94.0 \pm 11.2	90.0 \pm 9.1	<0.001
Differences between before and after education			
State anxiety (STAI Y-1)	7.09 \pm 7.02	5.33 \pm 7.70	0.001
Anxiety (VAS)	38.9 \pm 19.3	25.0 \pm 24.2	<0.001
Satisfaction	21.1 \pm 16.0	16.0 \pm 21.6	<0.001
Education time (s)	171.8 \pm 87.59	236.32 \pm 101.27	<0.001

SD standard deviation, *STAI* State-Trait Anxiety Inventory, *VAS* visual analogue scale

Table 2 shows a summary of the results. The comparison of needs-based education with traditional education showed a greater decrease in anxiety (STAI Y-1: 7.09 \pm 7.02 vs. 5.33 \pm 7.70, p = 0.001; VAS: 38.9 \pm 19.3 vs. 25.0 \pm 24.2, p < 0.001) and greater increase in satisfaction (21.1 \pm 16.0 vs. 16.0 \pm 21.6, p < 0.001) in the needs-based group compared with the traditional group.

The education time in the needs-based group was also significantly less than in the traditional group

(171.8 \pm 87.59 vs. 236.32 \pm 101.27 s, p < 0.001). The preferred amount of information for each topic in the needs-based education is shown in Table 3. More participants preferred concise information than detailed information, especially with regard to procedural details (73.8%). Few participants (<8%) preferred not to receive any information.

Table 3 Preferred amount of information on each topic

Topics	Preferred amount of information <i>n</i> (%)		
	None	Concise	Detailed
1. Disease information	8 (3.6)	111 (49.3)	106 (47.1)
2. Procedural details	16 (7.1)	166 (73.8)	43 (19.1)
3. Complications	–	125 (55.6)	100 (44.4)
4. Patient behavior	12 (5.3)	113 (50.2)	100 (44.4)
5. Pain	8 (3.6)	115 (51.1)	102 (45.3)

Discussion

Interpretation

Needs-based patient education decreased preoperative anxiety and increased satisfaction more than traditional patient education. Needs-based education also required less time, as almost half of the participants preferred concise information. This result highlights the benefit of patient assessment before providing information. Similar to the way in which patients have to be assessed before receiving treatment, patients' need for information should also be assessed before information is provided. This results in better outcomes and also saves time.

The better outcomes are consistent with the previous study on rheumatoid arthritis [14]. Needs-based education uses the principle of shared decision-making [15] and adult learning theory to provide different content based on an individual's background and needs [16]. Our study confirmed that needs-based education benefits surgical patients in addition to patients with rheumatoid arthritis, as shown previously.

There are many novel interventions that aim to improve preoperative patient education. However, although some of these interventions can improve other aspects, they generally do not decrease anxiety more than traditional education [4, 25–29]. These interventions include leaflets, video, interactive video, multimedia, and websites [25–29]. The major difference between these interventions and a needs-based intervention is the amount of information provided to patients. The various interventions represented changes in the mode of information delivery, but not changes in the amount of information provided. It is possible that the patient might not have received the amount of information suited to their coping style. For example, a patient with an avoidant coping style who desires a minimal amount of information may get more anxious as a result of the detailed information provided for general patients [1, 11, 12]. Therefore, the appropriate amount of

information should always be considered when addressing patient anxiety.

The result that needs-based education increased satisfaction was not surprising. When considering other interventions, almost all interventions were found to increase satisfaction [4, 25–29]. This can be explained by the fact that patients' expectations determine their satisfaction [30]. Any intervention additional to traditional care may surpass patient expectations and increase satisfaction [30]. What needs-based patient education offers that is different from other interventions is patient participation in choosing their own level of information. This participatory style is helpful and reported to increase satisfaction and reduce the number of patients that change their physician [31, 32]. However, it was surprising that needs-based education may offer these benefits with less time spent in education.

Needs-based patient education decreased time spent in patient education because most patients did not require detailed information for all relevant topics, and physicians could cover some aspects (especially procedural details) more concisely. It has previously been reported that some words that occur in procedural detail (e.g., 'knife' and 'scalpel') can also trigger anxiety [33]. As shortness of time is a major reason for omitting patient education [19], this method can save time in clinics and encourage physicians who have limited time to provide patient education.

Generalizability

Needs-based patient education is simple and easy to perform. The central aspect is to assess patient needs before providing information. The multicenter design used in this study enhanced the generalizability of the results for needs-based patient education in patients undergoing excision which is a common procedure in day surgery. As the intervention involved patients of both sexes, all ages (18 years and over), and all educational backgrounds, the outcomes suggest that a range of patients would benefit from needs-based patient education.

Limitations

First, basic procedures were chosen to limit confounding factors in this study, so the outcomes were limited to day surgery performed under local anesthesia. More complex procedures that involve general anesthesia or other types of procedures should be investigated in a further study. Second, cultural difference between countries should be aware before generalization of the findings because patients in different nations could be different. Third, outcome measurement was subjective and used a standardized

questionnaire. Fourth, patients who were illiterate and could not complete the questionnaire were not included in the study. The benefit of needs-based education is unclear in this population. Lastly, performing effective needs-based patient education requires practice. Physicians should receive training and understand the difference between concise and detailed information to be able to deliver information effectively.

Conclusion

Needs-based patient education can decrease preoperative anxiety and increase satisfaction compared with traditional patient education and takes less time.

Acknowledgements This study is dedicated to a girl patient who came to have surgery at our clinic and cried. She taught us that preoperative anxiety really existed and was critical. This research represents our promise to her that we will improve ourselves to serve patients better and will share our findings worldwide to help other patients like her.

Compliance with ethical standards

Conflict of interest None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

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