

# Animation for Anxiety Alleviation in Pediatric Cancer Patients *During Venipuncture in the Hospital*

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## Abstract

This preliminary study focused on the use of animation to reduce anxiety among pediatric cancer patients undergoing venipuncture in the hospital. It was conducted on 30 pediatric cancer patients aged 5-9 years. The Pretest- Posttest study method was applied in which the level of anxiety was measured before and after viewing the film and then it was analyzed to determine whether the animation could help relieve anxiety in the study population. The results demonstrated that with the use of the animation with visual fantasy in which a monster symbolized the pain young patients must endure during blood draws and a positive mindset toward such procedures were presented, 20 and 25 patients felt comfortable before and after viewing the animation, respectively. Four patients felt slightly anxious before and after the film. Two patients felt uneasy before viewing while no patients did after viewing. One patient experienced a high anxiety level before and after the animation. In addition, one patient was most nervous before, whereas none was after the viewing. It was concluded that by presenting the stories with a positive perspective and using symbols in the visual fantasy style, animation films can relieve anxiety in pediatric cancer patients undergoing blood sampling.

**Keywords:** Animation, Anxiety, Pediatric, Cancer, Hospital

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## Introduction

Psychosocial problems among children during hospitalization are common. Both occasional and frequent admission due to some serious chronic illnesses often cause a crisis in children as well as their parents and family members.

Khamenkan (2011) discussed the thinking process of children who are admitted to the hospital and explained that a child's reaction to an event occurs in the way that his thoughts and feelings are affected, giving rise to his cognitive perception and behavior. This previous study on the thoughts and feelings of 93 children aged 5-9 years admitted to the hospital by self-reporting and projective techniques found that the most significant children's thoughts and fear are related to being alone in the hospital. Being solitary inevitably exposes them to horrifying, painful, frightening, and miserable situations, leading to negative behaviors such as detachment, aggression, fear, and separation anxiety.

Anxiety caused by hospitalization directly affects a child's mental state and renders treatment difficult. Also, his parents' and caretakers' mental health will worsen. With the study of various pieces of related literature, the researchers therefore attempted to find a means to improve young patients' state of mind by relieving their anxiety.

Johnson et al. (Johnson, Whitt, and Martin, 1987) investigated the effects of fantasy on anxiety in chronically ill and healthy children. The study involved 52 children aged 5-9 years. The experimental group was stimulated by listening to stories read by their parents to develop visual imagination and then compared to the control group who merely played general games. The findings are as follows: 1. The experimental group was less anxious than the control group. 2. The reading activity was less effective among the healthy children. 3. The level of anxiety in the chronically ill children not stimulated by fantasy was unchanged. 4. The anxiety level in the children with persistent diseases was significantly reduced compared to that in the healthy children.

This means that stimulating fantasy in chronically ill children could significantly reduce anxiety. Fantasy is a concept that corresponds to the theory of human self-defense mechanisms.

Boonyapraphan (2018) discussed Sigmund Freud's theory of defense mechanisms in the article entitled "Defense Mechanism Styles: The World of Unconscious Mind" and that the self-defense mechanism is a means of human adaptation at the unconscious level, usually adopted by humans of all ages to apply in daily life. It is a process of adjusting when experiencing mind-affecting challenges to help release stress and uneasiness.

Therefore, when away from their parents, a world of imagination is one of the ways children adopt to defend themselves. Not only does being away from home to unfamiliar surroundings include attending school, but also being admitted to a hospital. In the hospital, with or without their parents around, children have to face pain when undergoing various medical procedures and treatments, including injections and intravenous infusion. As a result, when admitted to the hospital, young patients inevitably experience stress and anxiety from the unfamiliar environment.

Defense Mechanism	
Repression	Denial of Reality
Rationalization	Displacement
Projection	Introjection
Reaction Formation	Aggression
Help - rejecting Complaint	Undoing
Sublimation	Substitution
Symbolization	Withdrawal
Isolation	Egotism
Attention - getting	Conversion
Identification	Compensation
Fixation and Regression	Fantasy / Day Dreaming
Intellectualization	Suppression
Humor	Work and Perfectionism
Compulsive Fun Seeking	

Figure 1. Table of defense mechanism.

From the preliminary discovery, fantasy is a form of self-defense mechanisms. Fantasy is highly related to young people. Both children's literature and animated movies contain content that is almost entirely related to children's imagination. Often time children play with toys and imagine alone or they imagine themselves as one of the characters seen in a film. In addition, some children create their imaginary friends to play with. The researchers therefore looked into all forms of fantasy to determine which one is most appropriate for young patients.

In addition to the youth literature that uses fantasy to communicate with children, it is found that an animated film is another medium that can effectively bring fantasy to children. Some successful animated films have won an internationally recognized award such as the OSCARS or the Academy Award. Those motion pictures are produced entirely through fantasy.

Amornsupornsat (2010) provided findings on the effects of concrete-objective information program on pre-operative anxiety among school-age patients undergoing cardiac catheterization using animated movies as a way to communicate with the patient. It was concluded that the level of pre-operative anxiety decreased after receiving information through such animation.

Animation films are therefore a proper medium for communicating with children as they are highly imaginative. Due to no restrictions on filmmaking, there are no limits on the imagination on display. This entertainment type furthermore never fails to capture young people's attention.

In light of the information, creating animated films to alleviate anxiety among hospitalized pediatric cancer patients was of significant interest. Therefore, this study by focusing on both the visual characteristics and the plot of the film aimed to determine whether the animation could help relieve anxiety in the young cancer patients to prevent them from developing resistance to their medical treatment, which will adversely impact their own physical health and the mental health of their parents.

### Objective

To evaluate whether animated movies can be used to alleviate anxiety in pediatric cancer patients undergoing blood draws.

### Methodology

The animation development was divided into two parts: content and design development. In the content development part, three components were taken into consideration 1. factors affecting anxiety in children under medical treatment to be evaluated for the creation of the story structure. 2. the background and characteristics of the characters. 3. the form of fantasy that would be appropriate for presentation. All three elements considered data sets as follows:

	Factors	Feelings	Details
1	Separation from family and friends	Separation anxiety	People whom children love or are familiar with, such as parents, siblings, and close relatives.
			Friends
			Pets or objects that children are attached to, such as dolls and blankets
2	Being in an unfamiliar place or environment	Fear or unfamiliarity	Unknown person
			Unknown place
			Medical personnel
			The smell of various liquids
		Dislike	Loud noise in the hospital
			Dark and dull condition of the children’s ward
			Lighting at night
			Too hot or too cold environment in the hospital
			No toys or playgrounds in the hospital.
			Type or taste of hospital food
3	Medical treatment	Fear	Experiencing various procedures such as injections, blood sampling, and surgery
			Medical equipment such as syringes, blood pressure monitors, ear probes, and tongue depressors
			Treatment errors
			Physical harassment
			Intimidation for better cooperation
			Disability
			Pain
			Changes in physical condition
			Death
4	Loss of freedom	Loss	Freedom because of the need to be hospitalized for treatment
			Continuous academic progress
			Activity participation such as playing outdoors, playing sports, and traveling
			Sleep and movement
			Freedom to select types and amount of food
Freedom to spend time on activities such as watching TV or playing games at their own will			

Figure 2. Table showing factors affecting anxiety in pediatric patients undergoing medical treatment. (Coyne, 2007)

1.	Child patient and parent factors	The child has a shy personality and has difficulty adjusting.
		I am a child who is easily anxious.
		The child is easily irritated and angry.
		The child has had a bad experience with medical care before.
		Young age
		Children do not understand the treatment process or various procedures.
		The child must remain in the ward alone. without parents or caregivers watching over
		Children with other psychiatric disorders such as depression, anxiety, etc.
		Parents or caregivers are very worried about their child's illness.
		Parents or caregivers do not care or do not care about the child.
		Parents or caregivers rarely visit children in the hospital.
Parents or caregivers scold or intimidate children.		

Figure 3. Table showing characteristics and background that affect anxiety.

Fantasy genre for children	Description
Education, Entertainment and Power	This type of fantasy involves learning to use certain powers. The process of learning to control magic occurs through venturing through various lessons. Children will learn not to be attached to the power they have been given. A common obstacle is being a child faced with great magic.
Time displacement	This fantasy involves the impulse to learn and involves history or important people from the past. Stories are created from the uncertainty of certain energies. and transmission from a person who can fill in the incomplete past the fantasy created by distorting time will focus on Character changes growth and death Stories in this type of children's literature are often influenced by Contemporary concepts in science Especially the Theory of Relativity.
Animal, toy, and miniature people fantasy	It is a story that talks about animals, toys or dolls that look like humans, miniature people, or legendary creatures. The main idea of this type of fantasy is Making the child characters in the story more powerful, stronger, bigger than toys, small humans, or animals. Animal Fantasy is a subgenre that often describes intelligent animals. Sometimes they can live in their own world without having to deal with humans at all.
Alternative worlds	The structure of this type of fantasy is the creation of parallel worlds or dimensions with clearly visible boundaries. For example, a child may be stuck in a demon's magical world. and must protect the real world from dark forces The subject of God and Satan may be interwoven into the story. And sometimes parallel worlds are presented from the nodes of the mind. or even a world created from dreams.
Visual fantasy	Visual Fantasy emerged from the development of children's illustrated books. It will present characters that have fantasy qualities but must be highly fantasy-like. This type of fantasy is based on other types of fantasy. Instead, we focus on the details of the images that promote fantasy that can be connected to reality.

Figure 4. Table showing types of fantasy literature for children. (James, Edward, & Farah Mendlesohn, 2012: 51-60)

Based on the three sets of the data above, two questionnaires were developed. The first one studied issues related to hospital factors, as well as patient personalities and background which give rise to anxiety so that the study outcome could be applied in determining the story structure. The second questionnaire focused on issues regarding the types of fantasy that are appropriate to present through animation for young audience. The index of item

objective congruence (IOC) of both question sets was examined by one child and adolescent psychiatry specialist and two animation film experts. With their average IOC of 0.843 and 0.915, respectively, the results were that the two sets were accurately designed to fulfill their objectives and appropriate to apply in the production of animated films.

In the study of the first data set, hospital factors and the personalities and background of pediatric patients which affect anxiety were investigated to design the structure of the story. Data from two child and adolescent psychiatrists and one developmental-behavioral pediatrician were collected. It was discovered that factors affecting anxiety in hospitalized children included being separated from a loved one such as parents and friends, fear of various medical procedures and fear of pain. According to the second data set, factors regarding child patients and parents included that the child has a shy personality and difficult time adjusting; that the child is easily anxious; that the child has had a negative experience with medical treatment before; and that the child has other psychiatric disorders such as depression and anxiety disorder. These findings were then taken into consideration to identify conflict and character background in the animation story.

To determine which type of fantasy was proper to present through animation for children, the data from the same experts as the first data set were gathered and examined. The result indicated that the visual fantasy type was most suitable for use in animated films to alleviate anxiety in hospitalized children with cancer.

Once the factors affecting anxiety in hospitalized pediatric patients and the appropriate fantasy genre were determined, a four-minute animation was designed and produced for the study population.

### Research Subjects

The research data were collected at the Department of Pediatrics, Siriraj Hospital. Since this was a pilot study, the formula for calculating the sample size of Viechtbauer, Smits, Kotz, Bude, Spigt, Serroyen and Curzon (2015:1376) was used as follows:

$$n = \frac{\ln(1 - \gamma)}{\ln(1 - \pi)}$$

With the confidence level ( $\gamma$ ) of 95%, and the error level ( $\pi$ ) of 0.10,  $n = 29$ . Therefore, a sample of 30 cancer patients aged 5-9 years who were admitted to the general children's ward at Siriraj Hospital was studied.

### Inclusion Criteria

1. Diagnosed with cancer and currently receiving hospital treatment, with or without a history of having his blood drawn
2. Aged 5-9 years
3. Granted an approval from the treating physician to participate in the research

### Exclusion Criteria

1. Having a visual or hearing impairment
2. Being Thai-illiterate
3. Having a critical illness

**Withdrawal or Termination Criteria**






The volunteer participants wished to withdraw, or there were difficulties that obstructed the completion of the test.

**Subject Allocation**

This research study was endorsed by the Human Research Ethics Committee, Faculty of Medicine, Siriraj Hospital, Mahidol University, project code 572/2018 (EC4). The researchers and the research assistants who were the medical personnel of the Department of Pediatrics, Siriraj Hospital entered the ward to select pediatric patients who met the criteria. Then permission from the patient's doctor was requested before asking for consent to participate in the study from the patient and his parents. The data were collected from all those who agreed to participate. The Pretest – Posttest study method was applied with no random selection or grouping.

**Research Procedure**

The researcher designed a tool used to acquire data in a questionnaire by using the concept of Thai State - Trait Anxiety Inventory for Children - Revised (T - STAIC - R) of Chaiyawat (2000), devised for Thai children aged 8-13 year. However, this research project was conducted among Thai children aged 5-9 years, the researcher therefore developed an easy-to-understand questionnaire with illustrations similar to the characters in the animation.

Now I Feel				
1	2	3	4	5
				
I feel comfortable.	I feel a little worried.	I feel worried.	I feel very worried	I feel the most worried.




Now I Feel		
Very calm	Relaxed	Restless
		

Figure 5. Table showing the characteristics of the illustrations in the questionnaire.

This questionnaire was created from the tools of Spielberger, C. D., Edwards, C. D., Montouri, J., & Lushene, R. (1973), with the content validity index (CVI) of the Trait Anxiety measure (A - Trait) of 89. 5 %. Its structural validity was verified using the known - group technique,

convergent validity and factor analysis. The test-retest index was 0.58, and the Cronbach's alpha was 0.83. There were 19 items in the original questionnaire, each with three options. Each participant was asked to choose the option that best matched with his present feeling. (Kanchanarotphan, 2005)

The questionnaire was divided into three parts. In Part 1, there were seven questions regarding the participant's basic information. In Part 2, one question about his anxiety of blood collection and 19 questions regarding fear during hospitalization were originally listed. Part 3 included questions related to the respondent's preference for the animation character.

After the questionnaire was completely devised, its index of item objective congruence (IOC) was evaluated by two medical practitioners specializing in child and adolescent psychiatry and one in child development and behavior. The questions with the mean IOC lower than 0.5 were all excluded from the question sets.

Part 2 questionnaire was divided into two topics: the first one comprised one question with 10 available options asking about the respondent's anxiety, and the second was composed of 19 questions with respect to his fear during hospitalization.

In the first topic, there were five options failing to pass the selection criterion with their IOC less than 0.5 and therefore were removed: I feel most comfortable, I feel very comfortable, I feel somewhat comfortable, I feel a little comfortable, and I am quite worried.

There were originally 19 questions in the second topic, two of which yielded the mean IOC less than 0.5: I am sweating right now, and I feel uncomfortable. Those items were then eliminated from the questionnaire.

At this point, the total number of questions in the Part 2 questionnaire was reduced to 18 from 20. The average IOC of the questionnaire for the purpose of measuring anxiety among young patients with cancer during hospitalization was 0.78.

Topics in Part 2 questionnaire	number of questions
2.1 Anxiety of blood draw	1
2.2 Fear during hospitalization	17

Figure 6. Table of topics in part 2 of the questionnaire.

In the question regarding the respondent's anxiety, for the score assignment, the five-point rating scale was adopted. The score of 0.00-1.00 meant I feel comfortable; 1.01-2.00 I'm a little worried; 2.01-3.00 I'm worried; 3.01-4.00 I'm very worried; and 4.01-5.00 I'm the most worried.

For the fear-related questionnaire, the score was assessed based on the research study entitled "Factors Related to Fear in School-Aged Children Admitted to Hospitals" by Kanchanarotphan (2005). The scores of all questions were summed up to calculate the mean. When fear is high, so is the mean; whereas the mean is low as there is little fear. For the mean score interpretation, the average score of 1.00-1.66 corresponded to the low level of fear 1.67-2.33 moderate, and 2.34-3.00 high.



In this study, the pretest - posttest study method was applied as follows:

- Upon the approval by the Human Research Ethics Committee, the director of Siriraj Hospital and the head of the Department of Pediatrics were contacted and informed about the research project commencement.
- The head of the pediatric patient's ward was asked to recruit cancer patients who met the selection criteria.
- Selected patients and their parents received the document which explained the importance and procedures of the study and then were asked to sign the assent form and the informed consent form, respectively.
- The patients and their parents answered the questionnaire devised by the researcher. This questionnaire consisted of three parts:

*- Part 1 General information*

In a five-minute interview with the patient's parents, six aspects of the patient's personal information were obtained.

*- Part 2 Anxiety during a blood draw and fear during hospitalization*

18 questions were read to the patient by the researcher and then answered before and after viewing the animation (Pretest - Posttest). This lasted approximately 15 minutes each time, giving a total of 30 minutes.

*- Part 3 Preference for the film character*

After watching the film, 14 questions were read to the patient and then answered, taking roughly 10 minutes for each patient.

- The researcher ensured that each respondent understood all questions and graphics on the questionnaire when selecting his answer by reading and providing some explanation to the patient. Items found unclear to the respondent even with some explanation were noted to be discussed in the analysis of the study results.
- Each patient viewed the 4-minute animation film about hospitalization merely once.
- Data derived from the questionnaire were then analyzed to draw conclusions from the study.

### Outcome Measurement / Data Analysis

- Descriptive statistics were used to analyze the general data of the research sample. Continuous data were presented as the mean, and standard deviation (SD); or median, and minimum and maximum value (range). Categorical data were shown as a number and a percentage.
- Paired t - test and Chi - square statistics were adopted to make comparison between the data derived from the questionnaire about the patient's anxiety before and after the animated movie.
- Invariable analysis and multivariable analysis were performed to identify factors that may be related to anxiety among pediatric patients such as the number of blood draws, the length of time diagnosed with cancer.

### Outcome

Thirty young patients participated in this study project: 13 (43.3%) males and 17 (56.7%) females. 14 (46.7%) were diagnosed with leukemias, and 16 (53.3%) with cancerous tumors.

29 (96.7%) had been hospitalized, but 1 (3.3%) never had. 5 (16.7%) had experienced 5-10 blood draws, and 25 (83.3%) had had more than 10.

**Pre-viewing and Post-viewing Anxiety**

From the total of 30 patients, before viewing the film, most patients felt comfortable (20, 66.7%). Four, two, one, and three of them were slightly anxious, anxious, very anxious and most anxious, respectively. After the animation, the majority of them felt at ease (25, 83.3%). Four experienced a low level of anxiety whereas one a high level. None was found worried or most worried.

	n (%)	
	Pretest	Posttest
relaxed	20 (66.7)	25 (83.3)
a little worried	4 (13.3)	4 (13.3)
worry	2 (6.7)	-
very worried	1 (3.3)	1 (3.3)
most worried	3 (10)	-

Figure 7. Table shows the results on the level of pre-viewing and post-viewing anxiety.

1. *The research hypothesis is that after watching the film, young patients with cancer become less anxious about having their blood drawn than before the movie.*

Statistical results on anxiety for a blood collection in pediatric cancer patients before and after watching the animated movie.

	mean		Standard Deviation (SD)	
before the movie	1.77		1.33	
after the movie	1.23		0.63	
	n	Sum of Ranks	Z	sig. (1-tailed)
( after Anxiety Score ( before			-2.506	0.006**
Negative ranks	9	5.72		
Positive ranks	1	3.50		
Ties	20			

\*\*p<0.01

Figure 8. Table of Pretest-Posttest Statistical Analysis.

Nonparametric statistics by Wilcoxon Signed Ranks Tests were applied to compare the mean scores of anxiety before and after watching the animated movie. The Z value of -2.506 and the sig. (1-tailed) value of 0.006 were derived. With the sig. value less than 0.01, this means that after viewing the film, the young cancer patients felt significantly less worried about the blood draw at the significance level of 0.01.

**Fear During Hospitalization**

Pre-viewing and post-viewing fear level was found low in 18 (60%) and in 25 (83.3%) young patients, respectively, while 11 (36.7%) and 4 (13.3%) participants experienced moderate level of fear prior to and following the film. Merely one patient was found highly fearful before and after the animation.

	n (%)	
	Pretest	Posttest
Low	18(60)	25(83.3)
moderate	11(36.7)	4(13.3)
high	1(3.3)	1(3.3)

Figure 9. Table of Results on pre-viewing and post-viewing fear level during hospitalization.

2. *The research hypothesis is that during hospitalization after watching the animated movie, young cancer patients feel less frightened than before viewing the film.*

	mean		Standard Deviation (SD)	
before the movie	1.52		0.45	
after the movie	1.38		0.38	
	n	Sum of Ranks	Z	sig. (1-tailed)
Fear ( after Score ( before			-2.554	0.006**
Negative ranks	18	14.28		
Positive ranks	7	9.71		
Ties	5			

\*\*p<0.01

Figure 10. Table shows the statistical analysis of the fear score during hospital admissions of pediatric cancer patients.

The comparison between the mean fear scores prior to and following the film was carried out by the method of nonparametric statistics by Wilcoxon Signed Ranks Tests. The Z value was -2.554 and the sig. value (1-tailed) was 0.006. This concluded that the patients were significantly less scared after the film at the significance level of 0.01.

### Conclusion

This study investigated the effects of using animation films to relieve anxiety in pediatric cancer patients who had their blood drawn during hospital admission . Anxiety and fear are the important factor that directly affects the efficiency of medical treatment. When pediatric patients develop such feelings, resistance to treatment and loss of trust in their guardians and medical personnel arise. This study aimed to use the animation to alleviate anxiety and fear of a blood draw in hospitalized pediatric cancer patients. With the format of visual fantasy, the animated film was created with the storyline structured from hospital experience. The appearance of a monster as a symbolic representation of pain caused by medical treatment was included. Also, the characters whose personalities were properly designed to help the young patients see a positive perspective through them. 30 pediatric patients viewed the film and responded to both the pre-viewing and post-viewing anxiety/ fear questionnaire. After watching the movie, the patients showed a statistically significant reduction in anxiety and fear of having a blood draw. It can be concluded that animated films are a suitable tool for alleviating anxiety and fear of blood collection in hospitalized pediatric cancer patients.

## Suggestions

Since this is a preliminary study, in subsequent studies the sample size should be increased in order to determine other factors affecting anxiety among children with cancer undergoing blood collection during hospitalization to produce research results with a wider scope. The use of animation to relieve anxiety caused by other medical procedures may be studied.

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