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Improving the Cooperative level of Preschool Children During the Intra vena Injection Through Virtual Reality Cartoon Education

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Abstract---*Preschoolers who are hospitalized have higher anxiety and fear reactions, especially when given an intravenous injection which is included in an invasive procedure, therefore a distraction method is needed, such as an educational cartoon virtual reality. The purpose of this study was to determine the effect of educational cartoon virtual reality on the cooperative level of preschool children during intravenous injection procedures. A quasi experiment method with pretest-posttest control group design was used. The sample was 34 children aged 4-6 years who underwent treatment in one of the public hospitals in Atambua, who were selected by purposive sampling. The independent variable was educational cartoon virtual reality while the cooperative level was the dependent variable. Data were collected by using cooperative level observation sheet then analyzed using Wilcoxon sign rank test and Mann Whitney u test with significance p≤0.05. The results of this study showed that the cooperative level of the treatment group increased with a significance value of p=0.000, while the control group was not significant with a value of p=0.340. There was a difference in the cooperative level of preschool children in the control and treatment groups after being given the intervention of virtual reality educational cartoon with a significance value of p=0.000. Educational cartoon virtual reality can be used as an alternative distraction and educational media in improving the cooperation of preschool children during the intravenous injection procedure. Further researchers can develop educational cartoon virtual reality interventions in terms of content/topics, age targets, or other types of invasive procedures in hospitals or health centers*

Keywords--- *Virtual Reality; Cartoons; Education; Cooperative Level, Preschool*

I. INTRODUCTION

Preschool age children are vulnerable to disease, someone who is hospitalized will experience a variety of diagnostic examinations and medical treatment procedures [1]. One procedure that is often performed during treatment is administration of drug therapy via intravenous injection [2]. Cooperative behavior of children is very necessary during treatment in hospital to achieve an optimal healing process. One of the interventions that can improve children's cooperative behavior is using virtual reality educational cartoons which are a combination of interactive simulation technology and interesting and educational cartoon animation that can be an alternative method of distraction in preschoolers.

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The percentage of children who have health complaints and who suffer from illness in the young age group (0-4 years) is 22.20%, which is higher than the age group above it (5-9 years) at 18.16%, (10- 14 years) at 12.02%, and (15-17 years) at 8.77%. This is due to early childhood susceptibility to exposure to diseases which are not likely to cause death if not immediately treated [3]. According to data obtained from one of the public hospitals in Atambua the number of preschool aged children has increased during the last 3 years, i.e. in 2016 there were 432 children, in 2017 there were 424 children and in 2018 there were 459 children. Of the total number of children treated generally 100% undergo intravenous injection therapy and 75% get oral therapy and intravenous injection. According to the initial survey conducted on February 1, 2019, 4 out of 5 children treated in the Dahlia room showed that the child receiving the intravenous injection often cries, refuses, says it wants to go home, struggles, is fussy and always wants to be accompanied when undergoing the procedure.

Hospitalization has an impact on children's development. Preschoolers' reactions when they are treated in hospital include protests, despair and regression, which are proven by several examples including crying, kicking, hitting and showing other protesting attitudes so that it affects the length of stay, worsening the child's condition and can even cause death in children [4]. In sick situations, nurses can increase the patient's adaptive response by stimulating changes in the environment both internal and external [1]. Efforts made by the hospital in one of the public hospitals in Atambua, such as the policy on child nurses using pink clothes during night service, and other efforts of nurses such as persuading children, giving praise and showing objects around the child's environment to distract during intravenous injection procedures, have not had a significant effect on the cooperative level of preschool children when undergoing intravenous injection procedures. Health professionals must direct their attention towards providing atraumatic services aimed at minimizing the psychological and physical distress suffered by children and their families in the healthcare system [1]. Virtual Reality (VR) is an interactive computer simulation technology with a combination of input-output devices to provide stimulation to one or more senses so that users can interact deeply with virtual environments that appear to be in the real world [5]. By utilizing existing technology, it is expected that children will become more cooperative and undergo treatment while in hospital while experiencing pleasant feelings. VR can be an effective tool for minimizing pain and stress in children due to venous puncture [6]. The adoption of VR as a distraction technique will be superior to traditional distraction techniques because it offers deeper images through an occlusive and headset that projects images right in front of the user's eyes [7]. Another advantage of VR is its use which is simple / easy, non-invasive, self-manageable, cost-effective, and suitable for preschoolers, children, and adolescents who have creative imaginations [8]

AI. METHODS

The research design used in this study was quasi-experimental with a pretest posttest control group design. The treatment group in this study was given cartoon virtual reality during the intravenous injection procedure, while the control group was given intravenous injection in accordance with the standard operating procedures in one of the public hospitals in Atambua. The sample was 34 children aged 4-6 years who underwent treatment in in one of the public hospitals in Atambua in the hospital, where the parents were willing to be respondents, pediatric patients who were infused and underwent antibiotic injection therapy, pediatric patients who underwent second day care with malaria, GEA, TFA, Pneumonia, DHF and bronchial asthma, and pediatric patients in conscious condition. Each treatment and control group consisted of 17 preschool children. The independent variable was educational cartoon virtual reality while the dependent

variable was the cooperative level of the child during the intravenous injection procedure as measured by the cooperative level observation sheet.

Data collection was done by recording the names of respondents in the specified inclusion criteria. Before starting the research the researcher explained the things contained in the research explanation sheet to the respondent which included the title of the study, the purpose of the study, the rights of the respondents, the things done with this research and the way data was collected. Then the researchers gave informed consent to be signed by the respondents' parents. Researchers do time contracts with the respondent's parents and the respondent themselves each time the injection action will be carried out. The researcher also works with a nurse outside the shift to become a research assistant to facilitate data retrieval.

The researcher assessed the cooperative level on the first day of treatment in the morning by observing the cooperative level during the intravenous injection procedure. Data were analyzed using the Wilcoxon Sign Rank Test and the Mann Whitney U Test using the SPSS 25 application. This study has gained ethical approval from the Ethics Committee of the Faculty of Nursing, Airlangga University with number 1815-KEPK

III. RESULT

The results of the study (table 1) show that the age of preschool children in the majority treatment group was 5 years, as many as 7 respondents (41%) and the majority control group of children was 6 years, as many as 8 respondents (47%). The majority of the sexes in the treatment and control groups were men with 10 respondents (59%) and 11 respondents (65%) respectively. All respondents had never had experience of being treated in a hospital. The majority of families caring for children in hospitals are mothers, as many as 12 respondents (70%) in the treatment group and as many as 13 respondents (76%) in the control group. The majority of days of treatment in the treatment group were 4 days by 7 respondents (41%) and in the control group were 5 days by 7 respondents (41%). Types of disease diagnosis in pediatric patients treated in the treatment group were 7 respondents (41%) and in the control group were Malaria for 6 people (35%).

Table 1 Demographic characteristics of preschool children in the treatment and control group (n=34)

Characteristic	Treatment Group		Control Group	
	N	%	N	%
Age				
4 years old	6	35	5	29
5 years old	7	41	4	24
6 years old	4	24	8	47
Gender				
Male	10	59	11	65
Female	7	41	6	35
Families caring for children in the hospital				
Mother	12	70	13	76
Grandmother	3	18	2	12
caregiver	2	12	2	12
Long of stay in Hospital				
3 days	2	12	3	18
4 days	7	41	5	29
5 days	6	35	7	41
6 days	2	12	2	12
Diagnosis of disease suffered				
GEA	7	41	4	23
TFA	4	23	3	18
Pneumonia	2	12	1	6
Malaria	2	12	6	35
DHF	1	6	2	12

Asma Bronchial	1	6	1	6

Table 2 shows that most respondents in the control and treatment groups prior to the intervention were in the uncooperative category. This is indicated by the percentage value in the control group of 15 children (88%) and the treatment group for 16 children (94%). At the time of the post-test the control group was mostly in the uncooperative category of 13 children (76%) and during the treatment was mostly in the cooperative category as many as 15 children (88%). At the time of the post-test of uncooperative respondents, there were 13 children (76%).

Based on the Wilcoxon Sign Rank Test statistical test in the control group it was found that the value of p = 0.340 (p≥0.05), meaning that there was no significant difference in the level of cooperation during the pre-test and post-test in the group. While the Wilcoxon Sign Rank Test statistic test in the treatment group obtained p value = 0.000 (p≤0,05), meaning that there are significant differences in the level of cooperation during the pretest and posttest in the treatment group. Statistical test Mann Whitney U Test on the post-test of both groups obtained the value of p = 0.000 (α ≤ 0.05) which means that there is an effect of giving virtual reality education cartoons to the cooperative level of preschool children during the intravenous injection procedure.

Table 2 Cooperative level of respondents before and after the educational cartoon virtual reality intervention during the intravenous injection (n=34)

Level of cooperation	**Control group**				**Treatment Group**			
	Pre		**Post**		**Pre**		**Post**	
	n	%	n	%	n	%	n	%
Not Cooperative	15	88	13	76	16	94	2	12
Cooperative	2	12	4	24	1	6	15	88
P value	p = 0.340 *Wilcoxon Sign Rank Test (*p ≥ 0,05)				p = 0.000 *Wilcoxon Sign Rank Test (*p ≥ 0,05)			
	p = 0.000 *Mann Whitney U Test* (α ≤ 0,05)							

IV. DISCUSSION

The cooperative level of preschool children in both groups before being given the intervention of educational cartoon virtual reality during the intravenous injection procedure was mostly in the uncooperative category, which was demonstrated through the attitude of rejection when nurses arrived with injection equipment and when the injection procedure was performed. This proves that preschool children when undergoing treatment in the hospital tend to experience protests, despair and regression as evidenced by several examples of the appearance of children who have uncooperative attitudes of children during intravenous injection include crying, kicking, hitting and showing other protesting attitudes so that it affects length of stay [4]. This study also found three children aged 6 years who have a cooperative attitude even though no intervention has been given. The age of emotional development that a person has is in line with his age [9]. Maturity of emotional development affects the attitude response that affects the cooperative level of children during the implementation of intravenous injection procedures.

The cooperative level of children after being given an educational cartoon virtual reality intervention in the majority treatment group changed from uncooperative to cooperative when the nurse entered with the injection device, during the implementation of the injection procedure and when the nurse ordered the child to offer their hand to be injected. This

happened in the treatment group because the group was getting audio visual distraction by using a virtual reality cartoon. Changes obtained from observations generally occur in the child's behavior when the nurse arrives by bringing in injection equipment, the child no longer sends the nurse away or avoids eye contact with the nurse and the child's behavior when the nurse performs the injection procedure is that the child does not cry or try to hide. Children look more relaxed and enjoy watching the cartoons provided.

This is in line with research conducted by [10][11] in his research stating that virtual reality is considered an effective distraction technique for children and adolescents while undergoing venous puncture. Likewise, it is the same with [12] which states that distraction using virtual reality can reduce the pain and anxiety of children while undergoing invasive dental treatment.

There are some children who fall into the non-cooperative category in the treatment group. The average age of a child was 4 years old, with the family that cared for them while in the hospital are caregivers and have a medical diagnosis of GEA. The results of this study are in line with research conducted by [13] explaining that 4-year-olds tend to have a high level of dependency with parents so that when hospitalized they tend to reject the new environment. The involvement of parents and family members not only encourages the development of children's abilities and social skills, but also will provide support for the development of positive emotions, adequate personalities and care for others [1].

This study examined the differences in the level of cooperative treatment groups during intravenous injection procedures before and after the intervention. This is because the treatment group received audio visual distraction and education using the virtual reality cartoons provided. The intervention indirectly isolates the child's vision quickly and briefly from the outside world which has the potential to increase stress, anxiety and fear that affect the cooperative level so that the child is not aware of the existence of injection equipment and procedures being undertaken[14] [15]. In addition, from the interventions provided, respondents also received education from a number of cartoon themes provided, namely hospital treatment, PHBS washing their hands with soap, and the importance of eating fruit.

In the control group there was no difference in the level of cooperation during the intravenous injection procedure between before and after observation. This is because the control group respondents did not get distracted and were educated using cartoon virtual reality. The application of atraumatic care principles in the care of children in hospitals is very important in overcoming anxiety, fear and increasing the cooperative attitude of children during treatment procedures.

In the treatment group after the second post-test it was found 10 children were in the uncooperative category, and 7 children were in the cooperative category. This shows that the educational cartoon virtual reality intervention given does not yet have a significant effect on changes in respondent behavior. So we need to consider the timing of the intervention, which is not only enough for a day to apply. Changing a child's behavior from uncooperative to cooperative requires time and repeated stimulus and education.

So it can be concluded that the intervention of educational cartoon virtual reality can be a choice of distraction and education in accordance with preschoolers in order to be able to adapt and cooperate with intravenous injection procedures undertaken.

V. CONCLUSION

The cooperative level of preschool children patients during the intravenous injection procedure in one of the public hospitals in Atambua before being given an educational cartoon virtual reality intervention was mostly in the

uncooperative category. Educational virtual reality cartoons can be a choice of distraction method in increasing the cooperative rate of preschool age patients during the intravenous injection procedure in one of the public hospitals in Atambua There is a difference in the level of cooperation in the control group children without intervention with the treatment group given the intervention of virtual cartoon education during intravenous injection procedures.

CONFLICT OF INTEREST

No conflicts of interest have been declared

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