

Effectiveness of deep breathing clock in reducing the anxiety of school- aged children before vaccination

Karen Anne S. Bustos, B.N.S.,
Maria Cassandra B. Cabailo, B.N.S.*,
Albert James E. Cabaneros, B.N.S.*,
Joie Andrea Manuelle R. Cagampan B.N.S.*,
Asst. Prof. Elizabeth N. Jurado. MAN, M.N.S.* **

Abstract

This study aimed to determine the effectiveness of deep breathing clock as an interventional tool in reducing the anxiety of school-aged children before vaccination. This study used quasi experimental research design, specifically a pretest and posttest design. The samples were thirty participants composed of school-aged children ranging from 6-12 years of age and selected through purposive sampling. The study was conducted in selected health centers in Manila and in selected clinics. Children's Perioperative Multidimensional Anxiety Scale (CPMAS) was used for both pre and post assessment. The results found that using the deep breathing clock before vaccination significantly reduced the anxiety of school-aged children at the level of .01. Thus, the deep breathing clock was proven to be an effective interventional tool in decreasing the level of anxiety in school-aged children ranging from 6-12 years old before vaccination.

Keyword: *Anxiety, school-aged children, deep breathing clock, vaccination*

Introduction

The World Health Organization (WHO) describes vaccine as a biological preparation that improves immunity to a particular disease. The Centers for Disease Control and Prevention (CDCP) stated that on-time vaccination is essential to provide immunity to children before being exposed to potentially life-threatening diseases. These vaccines are tested to ensure that they are

safe and effective for children to receive at the recommended ages.

According to American Academy of Pediatrics, the use of vaccines has led to major improvements in child health over a relatively short period. Many of the infectious illnesses in the past, from chickenpox to polio to measles, no longer affect most children today. Administration

* College of Nursing, University of Santo Tomas, Philippines

** Assistant Professor, Lecturer, College of Nursing, University of Santo Tomas , Philippines

of vaccination aids in decreasing the mortality and morbidity rate of some vaccine preventable diseases. Thus, vaccination is considered as the preliminary step in helping children fight against some diseases. However, based on CDCP, immunization programs in resource-poor countries are faced with many barriers to success, such as shortage in trained staff and supervisors, vaccines, etc. Each year about 21.8 million children miss necessary vaccines, leaving them vulnerable to disability and death from serious infectious diseases.

However, injection-induced anxiety and pain are the most frequent adverse effect following vaccination (Taddio, Ilersich, Ipp, Kikuta, & Shah, 2009). Medical procedures that are applied using a needle, such as immunizations and vaccinations, are the most common sources of pain for children, causing anxiety, distress, and fear with significant consequences (Altay, Kilicarslan-Toruner, & Sari, 2017). Studies have also shown that children often describe medical procedures and the associated anticipatory anxiety of pain as the most distressing aspect of disease or hospitalization. This anxiety can be magnified if the child has had a previous unpleasant experience within the health care environment. The predictive nature of procedural pain provides an excellent opportunity for health care professionals to minimize the anxiety experienced by the pediatric clients (Winskill & Andrews, 2008). In addition, many research studies found out that different interventions, such as the use of breathing techniques, can be used to decrease the anxiety levels of patients. Kemper (2000) mentioned that

the most popular psychological nursing intervention for all diseases is teaching relaxation-breathing techniques. Nurses who encourage practicing deep breathing helped reduce tension-anxiety of hospitalized clients (Hayama & Inoue, 2012). Vancampfort, Redfern, & Green (as cited in Neeru, Khakha, D.C., Satapathy, S., & Dey, A.B., 2015) also added that it also resulted in decreased state of anxiety, psychological stress, fatigue, and increased subjective wellbeing. Chiang, Ma, Huang, Tseng, & Hsueh (2009) also mentioned in their study that the practice of relaxation breathing might change trait anxiety more than transitory emotional reactions. Furthermore, with increased school-based vaccinations for improved coverage rates and practicality, the World Health Organization (WHO) recently endorsed research to identify possible interventions to reduce vaccine-related pain and anxiety in mass clinical and school-based. This research aimed to study the effectiveness of a deep breathing clock as an interventional tool in reducing the anxiety of school-aged children before vaccination since this intervention has not ever been explored and is considered to be a blind spot in the nursing literature. The deep breathing clock was recalibrated into one whole minute. Instead of numbers, colors were used. Blue indicated that the client must inhale and hold while gray indicated that the client must exhale through the mouth with pursed lips. By utilizing a deep breathing clock, this served as an interventional tool and be considered as an alternative intervention in reducing the anxiety of school-aged children prior to vaccination. This served as an interventional tool and be

considered as an alternative intervention in reducing the anxiety of school-aged children prior to vaccination. Moreover, this intervention aimed to cater safe and quality nursing care for the mentioned age group.

Objective

This research aimed to study the effectiveness of a deep breathing clock as an interventional tool in reducing the anxiety of school-aged children before vaccination.

Hypotheses

There is a significant difference between the pre-assessment and post- assessment mean anxiety score of the experimental group.

Research Methodology

This research study made use of a quantitative approach and also used a quasi-experimental design, specifically the pre-test and post-test group design. The researchers used manipulation using the deep breathing clock.

1. Population and Sample

The researchers used purposive sampling method. It is a non-probability sampling method wherein samples are selected based on characteristics of a population and the objective of the study. The study included 30 participants as computed by the Power Analysis. The study participants were subjected to receive vaccinations such as flu vaccine, anti-rabies vaccine, tetanus toxoid, measles-mumps-rubella vaccine, and varicella vaccine. Power Analysis was used to

achieve an appropriate number of participants and to determine the probability of detecting an effect of a given size with a given level of confidence under sample size constraints. This also strengthened the statistical conclusion validity by estimating the required sample size needed (Polit & Beck, 2018).

The inclusion criteria of participants included (a) school-aged children, (b) ranging 6-12 years old, (c) regardless of gender, (d) must undergo vaccination, (e) must be in good medical condition and (f) regardless of the level of anxiety. The children must be in good medical condition with no existing morbidities so that no other factor can affect the response to the intervention and only the normal response from the child can be gathered after the intervention. Exclusion criteria included children (a) diagnosed of active respiratory illnesses such as asthma and pneumonia, and (b) with medical record of anxiety disorder, mental delay or retardation or psychiatric illnesses. Children with active respiratory problems are excluded because respiratory therapy often focuses on treating or alleviating generic problems that are amenable to intervention rather than being disease-specific. In some instances, however, interventions are selected based upon the underlying disease of the child. Children with underlying respiratory problem may have less or no desired effect from such at times (Wright, S., Wakeman, R., Collins, N., & Chatwin, M, 2018). Children with anxiety disorder, mental delay or retardation and psychiatric illness are excluded because it can affect the normal response to the intervention does and results can

be inaccurate. Screening analysis was done to ensure that participants met the inclusion criteria.

2. Data collection tools

The study utilized Children's Perioperative Multidimensional Anxiety Scale (CPMAS) which is a validated and modified assessment tool for data gathering process. The researchers asked permission on using the tool and was approved by the authors. The tool was translated from English to Filipino for the participants to better understand the tool. The CPMAS is a relatively simple and straightforward self-rating measures often represent particularly in the measurement of current anxiety. The CPMAS is a recently developed and validated self-report scale designed to measure children's state anxiety within a surgical context. This scale has been validated on school-aged children between the ages of 6–12 years. The CPMAS contains five items, to which the child responds on a visual analog scale that ranges from 0 to 100. The aim of the assessment tool was to assess the level of anxiety of male school age children. In addition, this assessment tool was validated by experts in psychiatric nursing, pediatric nursing and community health nursing.

The deep breathing clock was used as an interventional tool in reducing the anxiety of school-aged children which was authored by Hilary White. This was recalibrated into one whole minute which also means one whole cycle. The clock has blue and gray colors alternately instead of numbers from the usual clocks. Each color pertains to a certain instruction. Blue indicates that the respondent must inhale and hold while the gray indicates that the respondent

must exhale through the mouth with pursed lips. As the second hand of the clock passes through these colors the respondent must do the deep breathing exercise accordingly until 5 cycles are made. In addition, this interventional tool was also validated by experts in psychiatric nursing, pediatric nursing and community health nursing.

The Children's Perioperative Multidimensional Anxiety Scale (CPMAS) was found to have strong internal consistency (Cronbach's $\alpha > 0.89$), and good test-retest reliability (Intraclass Correlation Coefficient = 0.71) in some studies (Chow, Lieshout, Buckley, & Schmidt, 2016). In this study, after conducting a pilot test with 10 participants, the tool was found to have a Cronbach's α 0.97 which is significantly high.

3. Data collection

The researchers utilized this tool since, it is straightforward and measures the current anxiety of the child, which is what the researchers intend to measure. The researchers used this tool to conduct a pre-assessment (Time1) before the utilization of the deep breathing clock and post-assessment (Time2) after the utilization of the deep breathing clock. Results from CPMAS was relevant in determining whether the use of a deep breathing clock before vaccination could help in decreasing the level of anxiety of the participants. Furthermore, the scale was purely based on the patients' judgment or feeling regarding the situation.

4. Data Analysis

This study used descriptive statistics to summarize the anxiety scores of the participants. Specifically, mean and standard deviation was

used. For the inferential, this study used paired t-test as the statistical analysis. Paired t-test was used to determine whether the mean difference between two sets of observations is zero. This was used to compare the pre-assessment anxiety mean scores and post-assessment anxiety mean

scores of the experimental group. Data was interpreted with the following ratings of 0 to 4 mm which is considered as no anxiety; 5 to 44 mm, mild anxiety; 45 to 74 mm, moderate anxiety; and 75 to 100 mm, with severe anxiety.

Results

Table 1. The result were shown a pre-assessment anxiety score of the experimental group.

The experimental group	Mean	S.D.	Interpretation
Pre - assessment Anxiety Score	65.53	20.43	Moderate anxiety

From table 1 presented the pre-assessment mean anxiety scores of the experimental group. The pre-assessment anxiety score of the experimental group is 65.53 which indicated

that school-aged children had moderate anxiety before vaccination. This result affirmed that vaccination was one of the medical procedures that caused anxiety to school-aged children.

Table 2. The result were shown a post-assessment anxiety score of the experimental group.

The experimental group	Mean	S.D.	Interpretation
Post-assessment Anxiety Score	26.93	16.83	Mild anxiety

From table 2 presented the post-assessment mean anxiety scores of the experimental group. The post-assessment mean anxiety score of the experimental group was 26.93 which

indicated that school-aged children had mild anxiety after administering the deep breathing clock before vaccination.

Table 3. The result were shown a difference between the pre-assessment and post-assessment mean anxiety score of the experimental group.

The experimental group	Mean	S.D.	t -test	p-value
Pre-assessment Anxiety Score	65.53	20.43	9.94	.01
Post-assessment Anxiety Score	26.93	16.83	9.94	.01

From table 3 presented the pre-assessment and post-assessment mean scores of the experimental group. The pre-assessment results of the experimental group had a mean score of 65.53 and a post-assessment mean score of 26.93. These values reveal that the mean score of the pre-assessment and post-assessment of the experimental group had a mean difference of (+) 38.60. These values indicated that the usage of the deep breathing clock prior to vaccination significantly decreased the anxiety of school-aged children. It also showed a p-value of .01 which indicated that the null hypothesis was rejected. Thus, the alternative hypothesis H_a was accepted.

Discussion

The research study was conducted to thirty participants which composed of school-aged children ranging from 6-12 years of age. The participants were selected through purposive sampling from private clinics and government health centers in Metro Manila. Deep breathing clock was the tool used in determining the level of anxiety of the participants before and after the vaccination. Findings showed that before giving the intervention which was pre-assessment anxiety score, the participants had moderate anxiety. While after giving the intervention, post-assessment score revealed that the level of anxiety of school-aged children had reduced to mild anxiety. Therefore, the breathing clock was proven to be effective interventional tool in reducing the level of anxiety of school-aged children prior to vaccination. This could be an alternative tool not only to vaccination but to any

medical procedures as well such as skin test.

The researchers had encountered some challenges during the conduction of this study. First, the limitations in the number of participants related to age group. It was observed that this age group did not go to the clinics or centers for vaccination unless it was required by the schools. Most of the children who went to doctors for vaccinations were pre-school children. It took for the researchers to look for several clinics and centers in order to come up with the number of participants. Second, the follow-up care was done to the participants after the initial encounter with them. This due to time constraint and absence in the methodology. It can be suggested or recommended to the next researchers who will become interested to conduct the same study to consider the follow care for continuity of the study.

Clusters of anxiety-related adverse events following immunization (AEFI) had been observed in several countries and had disrupted country immunization programs (Loharikar, A., et al 2018). Loharikar, A., et al (2018) also mentioned that anxiety-related AEFI clusters could be disruptive to vaccination programs, reducing public trust in immunizations and impacting vaccination coverage; response efforts to restore public confidence could be resourcefully intensive. Health care providers should have trained on recognition and clinical management of anxiety-related AEFI; public health authorities should have plans to prevent and effectively manage anxiety-related. On the other hand, Borge and Wahi (2015) remarked that guided breathing showed positive

effect on the breathing pattern of patients. In turn, this could be a measure to reduce anxiety prior to vaccination, that could be applied and implemented in any settings such as the hospitals, or clinics.

Conclusion

With the significant result findings presented, the deep breathing clock was proven to be an effective interventional tool in decreasing the level of anxiety in school-aged children ranging from 6-12 years old before vaccination. It was shown that this interventional tool could be used as an alternative tool before medical procedures such as vaccination and could then be used as part of their independent nursing interventions for pediatric clients.

Recommendation

There are several recommendations for future researchers based on the results of present study:

1. Nursing Education

Nursing clinical instructors should promote the use of the deep breathing clock in Related Learning Experience (RLE) especially in pediatric wards, in lectures, school clinic, health centers, etc. Students are recommended to use this intervention prior to medical procedures that require needles such as skin testing, IV insertion, etc.

2. Nursing Practice

Results have shown that this interventional tool could be used to decrease the level of anxiety of school-aged patients before vaccination, hence,

this intervention was done to improve and add an alternative nursing intervention in the nursing service. Nurses can use this as an independent nursing intervention not only before vaccination but also to other medical procedures such as pre-operative teachings, before IV insertion, medication administration, skin testing etc. Lastly, the use of the deep breathing clock could be used in school clinics, health centers, and during home visit in the community.

3. Nursing Research

Future researchers should study how to extend the capabilities of the deep breathing clock by not only limiting it to school aged children but to pediatric patients in general through modification of the clock itself. Also, they can expand their review of related literature in their research study by using this study as a basis since minimal studies are made regarding the deep breathing clock. Future researchers can maximize their participants by increasing the number to further strengthen the study and also be gender specific since pain tolerance of a male participant is different from a female participant. In addition, future researchers could also follow-up the participant on the succeeding dose of the vaccine. Afterwards, the future researcher could then compare the results of the anxiety level of the child during her first dose and during her second dose of the vaccine. There should be a comparison of the deep breathing clock between the experimental group and the control group to confirm that it is not due to the first experience or maturity or to be durable.

References

Altay, N., Kilicarslan-toruner, E., & Sari, C. (2017). The effect of drawing and writing technique on the anxiety level of children undergoing cancer treatment. *European Journal of Oncology Nursing*, 28, 1–6.

Canbulat, N., Inal, S., & Sönmezler, H. (2014). Efficacy of distraction methods on procedural pain and anxiety by applying distraction cards and kaleidoscope in children. *Asian Nursing Research*, 8(1), 23–28.

Hockenberry, M., & Wilson, D. (2016). *Wong's Nursing Care of Infants and Children 1st edition*. Elsevier Inc. Singapore. Pte Ltd.

Polit, D., & Beck, C.T. (2018). *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. Philadelphia, United States of America

Wolters Kluwer. Riaz, A., Husain, S., Yousafzai, M.T., Nisar, I., & Shaheen, F., (2018). *Reasons for non-vaccination and incomplete vaccinations among children in Pakistan*. <https://doi.org/10.1016/j.vaccine.2018.07.24>

Taddio, A., Ilersich, A., Ipp, M., Kikuta, A., & Shah, V. (2009). *Physical Interventions and Injection Techniques for Reducing Injection Pain During Routine Childhood immunizations : Systematic Review of Randomized Controlled Trials and Quasi Randomized Controlled Trials*, <https://doi.org/10.1016/j.clinthera.2009.07.024>

Taddio, A., Ipp, M., Thivakaran, S., Jamal, A., Parikh, C., Smart, S., ... Katz, J. (2012). Survey of the prevalence of immunization non-compliance due to needle fears in children and adults. *Vaccine*, 30(32), 4807–4812.

