

## Effect of Palliative Care Education on Pediatric Nursing Student's Performance Regarding Care of Children with Cancer: An End of Life Simulation

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### Abstract

**Background:** Palliative care education and experience are essential to student competence in delivering high-quality palliative nursing care. Simulation has been linked to acquire clinical competency among student's performance during end-of-life simulations. **The aim of this study** was to evaluate the effect of palliative care education on pediatric nursing student's performance regarding care of children with cancer: An end-of-life simulation. **Study design** was quasi-experimental with pre / post-intervention (Study group and Control group) **Sample:** Systematic random sample of 226 pediatric nursing students from Pediatric Nursing Department. **Tool (1): A structured interviewing questionnaire sheet:** It included three parts: **Part (I):** Concerned with personal characteristics of the studied students. **Part (II):** Pediatric nursing student's knowledge. **Part (III):** Palliative care knowledge quiz examination. **Tool (2): Likert scale:** Attitude of pediatric nursing students toward palliative care for children with cancer. **Tool (3): An observational checklists:** used to assess student's practices regarding care of children in end life stage. **Tool (4): Acceptability Scale for student nurse palliative care simulation. Result:** There are a highly statistically significant difference (P-value <0.001) between study and control group at the pre/post implementation of palliative education concerning their total knowledge, attitude and practice score. **Conclusion:** It concluded that implementation of palliative care education is a highly effective method to improve pediatric nursing student's knowledge, attitude and practice. **Recommendations:** Application of standardized simulation concerning palliative care for children with chronic disease for more reality situation and improvement students' quality of palliative care.

**Keywords:** Palliative Care Education, Nursing Student's Performance, End of Life Simulation.

### Introduction

The ability to improve nursing students' communication skills is provided via simulation-based learning experiences (INACSL, 2020). Real children interact with high-fidelity simulators that imitate real-world child settings occurs in a safe, regulated environment as part of simulation-based learning. Medical errors are decreased since students can practice and learn without risks. Nursing students also acquire teamwork and behavioral skills because a healthcare professional's ability to work across disciplines is crucial (Anderson et al., 2019).

High-fidelity simulation makes use of robotic manikins to replicate real-world situations. The use of high-fidelity simulation in the instruction of difficult skills, such as end-of-life care, promotes the development of healthcare practitioners' affective, psychomotor, and cognitive abilities. A safe and encouraging learning environment is provided through high-fidelity simulation, which boosts students' self-confidence (Rattani et al., 2020). Reality shock strikes nursing students when they study in clinical settings. A beneficial and creative approach is using simulation to improve learning outcomes in nursing education. Opportunities for nursing students to engage in childcare and work in clinical settings have diminished due to the high demand for clinical placements and the low number of clinical instructors (Jawabreh, et al., 2019).

Students who participate in palliative care immersion experiences report feeling more prepared to care for terminally ill children in professional practice (Glover et al., 2019). Education in palliative care seeks to control children's symptoms, lessen their discomfort, and enhance their quality of life. Life-extending treatments have changed deadly illnesses into chronic illnesses, lengthening patients' lives and paving the way for specialized palliative care to play a significant role in health care systems and interprofessional collaboration. A vital part of palliative care teams is played by nurses. Overall, there is a much greater need for palliative care (Kirkpatrick et al., 2019).

To assist children with cancer and their families in coping with the physical, psychological, social, and spiritual side effects of cancer and its treatment, the discipline of pediatric palliative oncology has been grown. This results in

the creation of several palliative care programs that intended to reduce pain and offer families and children with cancer psychosocial assistance (Snaman et al., 2020).

A standard of care in pediatric oncology is pediatric palliative care which provides comprehensive care for the child and family and includes supportive care for children at any stage of cancer treatment. Palliative care for children should begin as soon as a disease is diagnosed and should last throughout the course of treatment. Additionally, palliative care includes end-of-life care, which is employed when curative therapy is no longer an option. Additionally, palliative care is linked to better symptom management, quality of life, adherence to cancer therapy, and higher survival rates (Cordoba et al., 2020).

Cancer is an abnormal proliferation of cells multiply despite space constraints, the availability of nutrients to other cells, or signals from the body to inhibit reproduction. Cancer cells can spread to too many parts of the body, are frequently structured differently from healthy cells, and do not function properly (Pezah et al., 2021). Leukemia, brain malignancies, lymphomas, and solid tumors including neuroblastoma and Wilms tumors are the most prevalent types of cancer in children. So, the need for correct diagnosis is an essential item to determine an appropriate therapy according to the type and extent of the disease. The standard therapies of cancer include; chemotherapy, surgery and radiotherapy (World Health Organization, 2021).

The quality of care given to children with cancer is significantly influenced by nurses, who play a key role in delivering palliative care. As providing the best palliative care practices can help children avoid or lessen their suffering. This role include; assessing disease symptoms and psychological distress, ensuring that symptoms are managed effectively, as well as providing psychological and social support for children and their families (Linder, 2021). The importance of palliative care given by pediatric oncology nurses has drawn more attention. So, nurses need to have high quality level of palliative care through providing palliative care programs which aimed to enhance nurses' knowledge and practices regarding palliative care for children with cancer (Nadeau et al., 2020).

**Significance of the study:**

Cancer is the top cause of mortality for children worldwide as, approximately 85% of children and adolescents with cancer live in low- and middle-income countries. In addition to, nations with low and moderate incomes account for more than 90% of all annual deaths from childhood cancer and cure rates are only 15%-45% (*Linder, 2021*).

In order to achieve a minimum global survival rate of 60% for juvenile cancer in 2030, the World Health Organization (WHO) created the Global Initiative for juvenile Cancer in 2018. Through greater awareness at the national and international levels as well as expanded capacity to provide best practices in cancer care, this project specifically aims to increase the priority given to childhood cancer (*World Health Organization, 2021*).

Basic nursing values, such as providing care for children and their families regardless of their age, culture, financial situation, or diagnosis, and fostering caring relationships that transcend space, time, and particular circumstances, are consistent with the palliative care approach (*Sabaq and Khalaf, 2016*).

Moreover, the development of combination therapies regarding cancer treatment leads to improved survival rates which resulted in the need of nurses to improve their knowledge and skills about palliative care of children with cancer (*Linder, 2021*). So, this study aims to evaluate the effect of palliative care education on pediatric nursing student's performance regarding children with cancer: An End of life simulation.

### Aim of the study

The aim of this study was to evaluate the effect of palliative care education on pediatric nursing student's performance regarding care of children with cancer: An end of life simulation through:

- Assessing knowledge, attitude and practice of pediatric nursing students regarding palliative care for children with cancer.
- Designing and implementing palliative care educational simulation program based on student nurses' actual needs about palliative care.
- Evaluating the effect of palliative care educational simulation program on nurses' knowledge, practice, and attitude toward palliative care for children with cancer.

### Research Hypotheses:

- The level of nurses' knowledge about palliative care for children with cancer will be improved significantly post palliative care education.
- The level of nurses' attitude towards palliative care for children with cancer will be changed significantly post palliative care education.
- The level of nurses' practice about palliative care will be improved significantly post palliative care education.

### Subjects and method

#### Research design:

Quasi-experimental design with pre / post-intervention (Study group and Control group).

#### Research settings:

The study was conducted at Clinical Pediatric Laboratory Skills for third year students, it consist of two Pediatric Nursing Laboratory in fourth floor in Faculty of Nursing and teaching hall of Faculty of Nursing / Benha University.

#### Sample:

Systematic random sample of 226 pediatric nursing students from Pediatric Nursing Department, third year in

the first semester of the academic year 2021-2022. The total number of the students was divided randomly into two identical groups [study group (n=113) & control group (n=113)]. In a systematic random sampling, the population is chosen at random as the beginning point, and a sample is then drawn at regular, defined intervals, depending on the size of the population (*Thomas, 2020*).

#### Inclusion criteria:

- Students from both genders.
- Age of students ranged between 20<25 years.

#### Exclusion criteria:

- Students previous attaining palliative care course by using simulation.

#### Tools of data collection:

There were three tools utilized to collect the required data. Those tools as the following:

#### Tool (I): A structured interviewing questionnaire sheet:

It was developed by the researchers based on the scientific literature, it included three parts:

**Part (I):** Concerned with personal characteristics of the studied student's such as; Age, gender, academic year, previous experience with loss and present experience of loss.

#### Part (II): Pediatric nursing student's knowledge

The researchers designed it after reviewing related references *Barros, et al. (2021)* and to assess pediatric nursing student's knowledge, it consists three parts:

**First part:** Concerned with assessment of students' knowledge related to cancer. It included 7 open ended questions such as; Definition, causes, clinical manifestation, types of cancer, stages, diagnosis and treatment of childhood cancer.

**Second part:** Concerned with assessment of students' knowledge related to end life stage. It included 8 open ended questions such as include: Define of death, define of end life stage care, needs of children in end-stage care, the major causes for children fear from dying children, methods for talk with children about death, methods for meet children needs and caregiving in the final stages of life and end-of-life planning.

**Third part:** Concerned with assessment of students' knowledge related to children grief in end life stage. It included 6 open ended questions such as include: Define of children grief, children needs during grief, clinical manifestation, stages, methods of coping with grief, methods can be used for decrease children fear during end life stage.

#### Scoring system of the knowledge questionnaire sheet:

After completing the interview questionnaire, the student's knowledge was reviewed, and their knowledge was verified using a model key response, and accordingly, the complete correct answer was given (2) scores, (1) for incomplete correct answer and (0) for do not know answers. According to the students' responses, their general level of knowledge was divided in to unsatisfactory level (less than 60%) or a satisfactory level (from 60% to 100%).

#### Part (III): Palliative care knowledge quiz examination

The researchers designed it after reviewing related references *Jalonen, (2022)*, is a popular and reliable technique for evaluating knowledge of palliative care. It had 15 items total, divided into three subscales, including four questions about the philosophy of palliative care, eight questions about how to manage pain and symptoms, and three questions about psychological and spiritual support. The respondents select "true," "false" or "do not know" for each item. We assigned a 1 score for correct answer and a 0 score for wrong and "don't know" answer. Total scores

range from 0–15. The total knowledge score was categorized into either, poor (< 60%), pass (60% - < 65%), good (65% - <75%), very good (75% < 85%) and excellent ( $\geq 85\%$ ).

**Tool (2): Likert scale: Attitude of pediatric nursing student toward palliative care for children with cancer.**

The scale was adapted from a standardized Likert type rating scale by *Frommelt, (2003)* and modified to assess nurses' attitudes toward children with cancer in end stage life stage. It contains 23 items tool using a three-point Likert scale from yes (2), sometimes (1) and no (0) such as; (giving care to the dying child is a good experience, caring for the children and family should continue during the grieving and bereavement period as well as to the dying child's family.). Total scores were ranged from 23-46.

**Total scoring system of the attitude**

- Negative attitudes (< 60%)

- Positive attitudes ( $60\% \leq 100\%$ )

**Tool (3): An observational checklists**

The checklists were adopted from *Aslakson, et al. (2017)*, to assess student's practices regarding care of children in end life stage. It included five procedures' checklists: pain relief (9 items), oxygen therapy (12) items, nutrition (14 items), child activity (8) items, preparation before chemotherapy/ Radiotherapy (7 items) and care during and after chemotherapy/ radiotherapy (23 items). Total procedure sub-items included 73 statements. Practical examination (Sim - Baby) mannequin simulator was utilized to evaluate the practical skills of pediatric nursing students (pre/ posttest).

The overall level of students' practice was classified based on their actual responses, as poor level (less than 50%), average level (50% to less than 75%) and good level (75% to 100%).

**Tool (4): Acceptability scale for student nurse palliative care simulation**

The researchers designed it after reviewing related references. Acceptability scale for student nurse palliative care simulation was the most used scale that provided quick and reliable tool for measuring student's satisfaction toward using of high-fidelity simulation during learning. The scale was consisted of a 12 items questionnaire with five response options for respondents: from very difficult to very easy. The score of each item of the previous scale was ranged as the following: very difficult (1), moderate difficult (2), difficult (3), easy (4) and very easy (5). **Scoring System of Acceptability Scale**

Calculation of the acceptability scales score; first sum the score contributions from each item. Each item's score contribution was ranged from 1 to 5. Total acceptability scale score had ranged from 0 to 60. The total scoring system of the scale: difficult (0 - < 20), moderate (20- < 40) and easy (40 -  $\leq 60$ ).

**Tools validity and reliability**

**Validity**

The researchers guarantee that elements of the study instrument were presented to a jury of five experts in pediatric nursing to test face and content validity in order to measure the study instrument's content validity. Modifications of the study instruments were done according to the panel judgment on clarity of sentences, appropriateness of content and sequence of items.

**Reliability**

Regarding reliability, internal consistency of all items of the tools was applied by the researchers by using Cronbach's coefficient alpha. This turned to be (0.72) for

knowledge assessment questionnaire to assess pediatric nursing student's knowledge. Reliability of attitude, the value was (0.79). Reliability of an observational checklist sheet, the value ranged from 0.97 to 0.99 and reliability of palliative care quiz for nursing was found 0.60.

**Ethical considerations**

Before beginning the study, an ethical approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing before conducting the study. Each student offered their verbal agreement before participating in the study. The nature of the study and its anticipated results were stated in straightforward and simple terms. The students were secured that all data collected was treated in confidentiality and anonymity and used only for the research purpose. All the study subjects had the freedom to discontinue at any moment. Official permission for data collection was obtained from the Dean of Faculty Nursing. The title, objectives and outcomes of the study were illustrated as well as the main data items to be covered.

**Pilot study**

To assess the reliability and applicability of the study tools and to determine how long it would take to complete the questionnaire, a pilot study had been performed on 10 % of the total sample size (22 pediatric nursing students) over a period of two weeks. The study sample was expanded to include the pilot subjects because no significant changes were made to the study tools.

**Field work:**

**a) Assessment Phase**

Benha University's Faculty Dean of Nursing gave his approval for the study to proceed. The actual fieldwork was completed over the period of three months, from the beginning of October 2021 to the end of December 2021, throughout the academic year. Immediately after obtaining approval from the faculty ethics committee. The total of study sample was (226) participating in the study, and then were divided to 113 as a study group and 113 as control group. The study group divided into (8: 9 groups), each group consists of (12:13 students). The researchers interviewed each student. By rotation, three days a week from 9 to 3 p.m., each student was interviewed for approximately 10 to 15 minutes to complete the knowledge questionnaire sheet regarding palliative care for children with cancer (Tool 1) and the attitude likert scale (Tool 2). Additionally, each student was observed while providing palliative care for children who were near the end of their lives using an observation checklist (Tool 3). Each observation took between 20 and 35 minutes to complete.

**b) Program construction:**

The educational program for students was designed by the researchers according to the student needs regarding palliative care for children with cancer. It was constructed, revised and modified from the related literature to improve the student knowledge, attitude and practices regarding palliative care for children with cancer.

**c) General objectives:**

The aim of the palliative care was to improve the student nurses' knowledge, attitude and practice regarding caring for children in the end stage of life and dealing with the family will prepare the participants for this situation in a real clinical setting.

**e) Program implementation:**

The program was implemented at the study settings through 15 sessions (10 sessions for theory and 5 sessions for practice). A time schedule suitable for students was developed to conduct the program that included; date, place, topic, time, and duration of each session. The theoretical

part cover (cancer, end life stage and child grief) and the practical parts cover the nursing role related to pain relief, oxygen therapy, nutrition, child activity, preparation before chemotherapy/ radiotherapy and care during and after chemotherapy/ radiotherapy. Prior to training sessions, a preliminary evaluation of each student's knowledge and practice utilizing simulation was conducted using tools 1 and 3. The training started by teaching the theoretical part about palliative care for children with cancer. The researchers conducted the sessions with the students in the study group three times per week for 4 weeks. The theoretical pediatric course consists of definition, indications, equipment and procedure for each procedure and takes about 30 minutes for knowledge. Practical part: started by setting objectives of simulation based on training, preparation of the content which covered the reason behind the application of the sessions, pain relief, oxygen therapy, nutrition, child activity, preparation before chemotherapy/ radiotherapy and care during and after chemotherapy/ radiotherapy. The clinical pediatric nursing laboratory skills were demonstrated and redemonstrated in two sessions for each group, two sessions per day/roughly two to three days per week for 45 days. The length of each session ranged from 35 to 45 minutes, depending on the students' understanding and responses. Each student takes about 15-20 minutes for pain relief, oxygen therapy, nutrition, child activity, preparation before chemotherapy/ Radiotherapy and care during and after chemotherapy/ radiotherapy. Under the observation of researchers, each student was permitted to carry out every step of each procedure in the faculty clinical pediatric nursing laboratory skills. The researchers were repeated procedures until the student mastered these skills. Methods of teaching were lectures, brainstorming, group discussion, hand out, demonstration and redemonstration.

#### f) Evaluation phase:

Using pre- and post-examination forms, the researchers monitored the students' practice of pediatric clinical skills after using simulation throughout this time. They also evaluated the students' knowledge and attitude using a self-administered questionnaire sheet.

#### Statistical analysis

Utilizing an electronic computer and the SPSS version 20 statistical tool, the acquired data were arranged, tabulated, and analyzed. Mean and standard deviation for quantitative data, and frequency and distribution for qualitative data, were determined as descriptive statistics for the data. In analytical statistics, the chi square test (X<sup>2</sup> value) was used to compare categorical data between groups. There was also usage of the Pearson correlation coefficient test. In all analyses, a P value of 0.05 or less was deemed statistically significant (\*), a P value of greater than 0.05 was deemed statistically insignificant (\*\*), and a P value of 0.001 or more was deemed extremely significant (\*\*\*)

#### Results

Majority (80.8% and 90.4%) of the study and control groups had an age between 20-22 years old with, mean age of 20.61±0.59. In relation to student gender, nearly two thirds (69.9% and 61.1%) of the study and control groups were females.

**Table (1):** Illustrates that, a highly statistically significant improvement in knowledge for the studied student regarding definition, etiology, clinical manifestation, stages, diagnosis and treatment of cancer at the post palliative education as compared to pre palliative education (**P=<0.001**).

**Table (2):** Clarifies that, there is a highly statistically significant difference in knowledge of the studied students regarding needs of children and care of children in end stage of life at the post palliative education as compared to pre palliative education (**P=<0.001**). Meanwhile, (100%) of the control group hadn't satisfactory knowledge about end life stage items in the pre and post palliative education.

**Table (3):** Shows that a highly statistically significant improvement in knowledge for the studied student regarding definition, clinical manifestation, stage of grief and methods of decrease children fear at the post palliative education as compared to pre- palliative education (**P=<0.001**). Meanwhile, (100%) of the control group hadn't knowledge about children grief in end life stage of cancer in the pre and post palliative education.

**Table (4):** Demonstrates that, there is improvement in student's knowledge of cancer, end-of-life stages, and children's grieving that statistically significant at post palliative education when compared to pre-palliative education. (**P=<0.001**).

**Table (5):** Presented that, there was a highly statistically significant differences between study and control groups in relation to all items of care for children with cancer in end life stage at post palliative education as compared to pre palliative education (**P<0.001**).

**Table (6):** Clarifies that, in regards to their overall knowledge, behaviors, and practice score, there was a highly statistically significant difference (**P< 0.001**) between the study and control groups at the pre and post implementation of palliative education.

**Figure (1):** Shows that, the majority (100%) of study group had satisfactory knowledge regarding cancer, end stage of life and children grief at the post palliative education as compared to pre palliative education. While, more than three quarters (84.1% & 89.4%) of control group had unsatisfactory knowledge regarding palliative care in the pre and post palliative education.

**Figure (2):** Shows that, the majority (86.4.0% & 83.0 %) of study & control groups had poor level of knowledge regarding palliative care for children with cancer in the pre palliative education. While, nearly two thirds (64.1%) of study group had excellent level of knowledge in the post palliative education.

**Figure (3):** Reflects that, the majority (89.4%) of the study group had positive attitudes towards care of children with cancer in the post palliative education as compared to pre palliative education. While, majority (94.1% & 70.6%) of the control group had negative attitudes towards care of children with cancer in the pre and post palliative education.

**Figure (4):** Shows that, the majority (86.7%) of study group had good practice in the post palliative education as compared to pre palliative education. While, less than one quarter (61.1%) of control groups had poor practice in the pre and post palliative education.

**Figure (5):** Illustrates that, the less than two thirds (61.1%) of the study group had moderate acceptability level for palliative care simulation in the pre palliative education. Meanwhile, nearly the majority (81.5%) of study group had easy acceptability level in the post palliative education. Moreover, there was a highly statistically significant difference (**p <0.001**) in favor of post palliative education.

**Table (1):** Comparison of the student's nurse knowledge regarding cancer at pre and post application of palliative care education (study and control, n=226).

Items	Study group (n=113)				X <sup>2</sup>	P value	Control group (n=113)				X <sup>2</sup>	P value
	Pre palliative education		Post palliative education				Pre palliative education		Post palliative education			
	In complete correct answer	Wrong or unknown	complete correct answer	In complete correct answer			In complete correct answer	Wrong or unknown	In complete correct answer	Wrong or unknown		
	%	%	%	%			%	%	%	%		
Define of cancer	99.1	0.9	100	0.0	226.00	0.00	8.0	92.0	0.1	99.0	6.696	0.210
Etiology of cancer	98.2	1.8	92.0	8.0	11.228	0.00	8.8	91.2	3.5	96.5	2.741	0.098
Clinical manifestation	99.1	0.9	100	0.0	226.00	0.00	8.8	91.2	1.8	98.2	5.632	0.218
Types of cancer	96.5	3.5	93.8	6.2	11.042	0.00	7.1	92.9	0.9	99.1	5.670	0.017
Stages of cancer	100	0.0	93.8	6.2	226.00	0.00	5.3	94.7	3.5	96.5	0.419	0.518
Diagnosis of cancer	100	0.0	95.6	4.4	226.00	0.00	7.1	92.9	3.5	96.5	1.408	0.235
Treatment of cancer	100	0.0	93.8	6.2	226.00	0.00	8.0	92.0	4.4	95.6	1.218	0.270

**N.B:** After palliative care intervention none of the study group have wrong or unknown knowledge.

**Table (2):** Comparison of the student's nurse knowledge regarding end life stage at pre and post application of palliative care education (study and control, n=226).

Items	Study group (n=113)				X <sup>2</sup>	P value	Control group (n=113)		X <sup>2</sup>	P value
	Pre palliative education		Post palliative education				Pre palliative education	Post palliative education		
	In complete correct answer	Wrong or unknown	Complete correct answer	In complete correct answer			Wrong or unknown	Wrong or unknown		
	%	%	%	%			%	%		
Definition of death	90.3	9.7	96.5	3.5	210.00	0.000	100	100	-	-
Definition of end life stage care	98.2	1.8	88.5	11.5	15.57	0.000	100	100	-	-
Children needs in end-stage of life	99.1	0.9	100	0.0	226.00	0.000	100	100	-	-
Methods for talk children about death	3.5	96.5	87.6	12.4	213.55	0.000	100	100	-	-
Methods for meet children needs	3.5	96.5	91.2	8.8	214.57	0.000	100	100	-	-
Care of children in the end stages of life	8.0	92.0	93.8	6.2	210.25	0.000	100	100	-	-

**N.B:** After palliative care intervention none of the study group have wrong or unknown knowledge

**Table (3):** Comparison of the student's knowledge regarding children grief in end life stage at pre and post application of palliative care education (study and control, n=226).

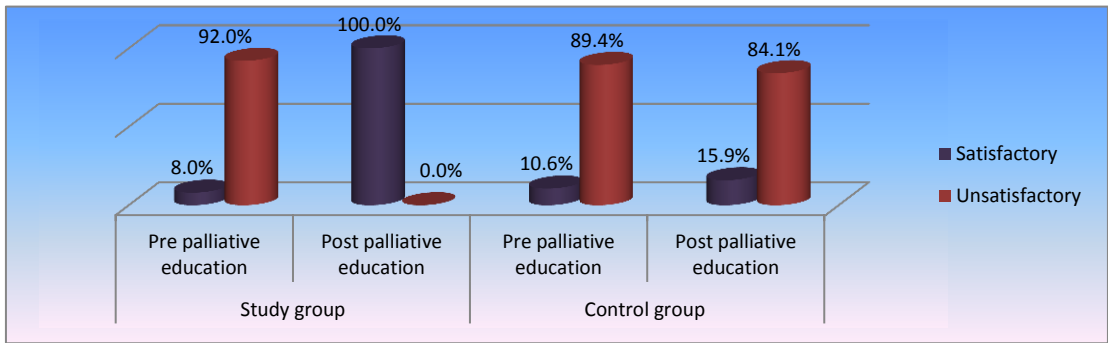
Items	Study group (n=113)				X <sup>2</sup>	P value	Control group (n=113)		X <sup>2</sup>	P value
	Pre palliative education		Post palliative education				Pre palliative education	Post palliative education		
	In complete correct answer	Wrong or unknown	Complete correct answer	In complete correct answer			Wrong or unknown	Wrong or unknown		
	%	%	%	%			%	%		
Define of children grief	8.8	91.2	95.6	4.4	206.92	0.00	100	100	-	-
Children needs during grief	7.1	92.9	83.2	16.8	27.608	0.00	100	100	-	-
Clinical manifestation	0.9	99.1	94.7	5.3	203.22	0.00	100	100	-	-
Stages of grief	11.5	88.5	85.8	14.2	29.046	0.00	100	100	-	-
Methods for coping with grief	9.7	90.3	88.5	11.5	202.16	0.00	100	100	-	-
Methods for decrease children fear during end life stage	10.6	89.4	92.0	8.0	205.42	0.00	100	100	-	-

**N.B:** After palliative care intervention none of the study group have wrong or unknown knowledge.

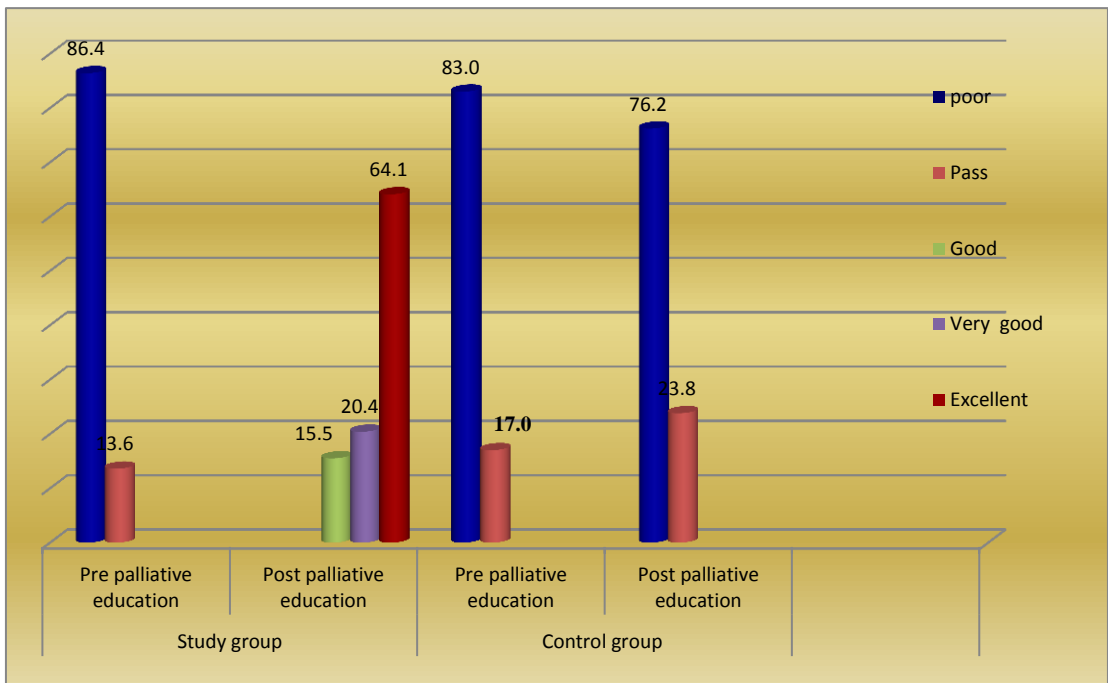
**Table (4):** Comparison of the studied student's total knowledge regarding cancer, end of life stage and children grief pre and post application of palliative care education (study/ control group (n=226).

Items	Study group(n=113)		t	P	Control group(n=113)		t	P
	Pre palliative education	Post palliative education			Pre palliative education	Post palliative education		
	Mean ±SD	Mean ±SD			Mean ±SD	Mean ±SD		
Cancer	1.500±0.5011	1.5398±0.4995	3.055	0.003	1.500±0.5011	1.132±0.3400	9.467	0.241
End life stage	1.490±0.4911	1.531±0.500	2.682	0.008	-	-	-	-
Children grief	1.500±0.5011	1.548±0.4987	3.393	0.001	-	-	-	-

**Figure (1):** Percentage distribution of the studied student’s (study / control group) according to their total knowledge regarding cancer, end stage of life and children grief (n=226).

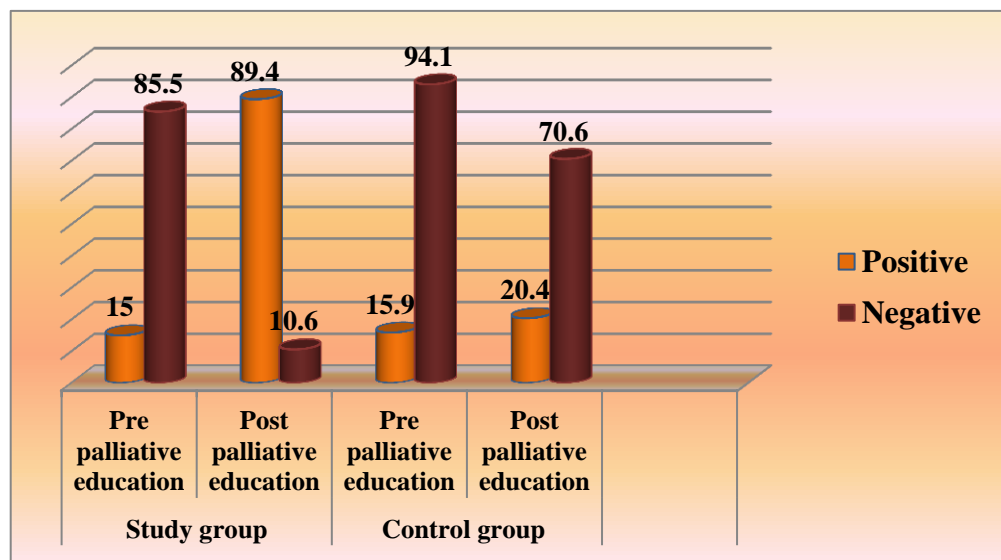


**Figure (2):** Percentage distribution of the studied student’s (study / control group) palliative care Quiz exam regarding palliative care for children with cancer (study and control, n=226).



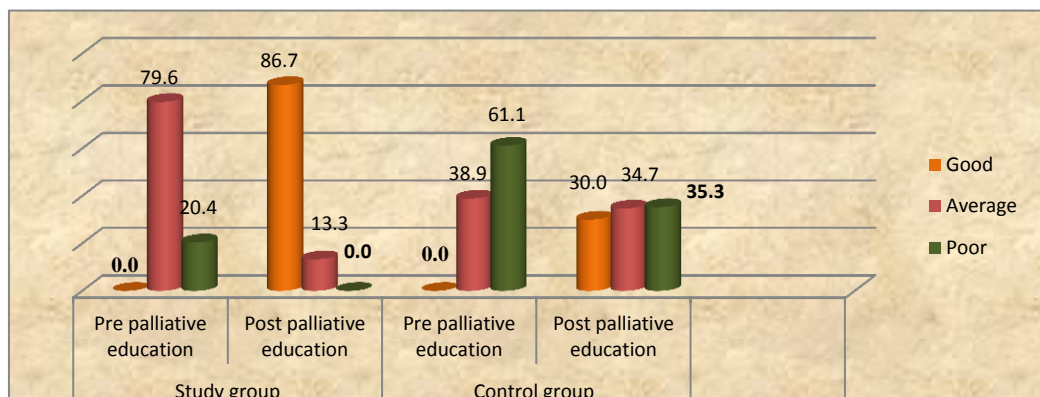
**Table (5):** Comparison of the studied student practice regarding care of children in end life stage of cancer (n=226)

Items	Study group(n=113)				X <sup>2</sup>	P value	Control group (n=113)					X <sup>2</sup>	P value
	Pre palliative education		Post palliative education				Pre palliative education		Post palliative education				
	Done incorrectly	Not done	Done correctly	Done incorrectly			Done incorrectly	Not done	Done correctly	Done incorrectly	Not done		
	%	%	%	%			%	%	%	%	%		
Pain relief	77.0	23.0	91.2	8.8	107.085	0.00	75.0	25.0	50.0	25.0	25.0	89.21	0.00
Oxygen therapy	86.7	13.3	90.0	10.0	164.093	0.00	85	15.0	70.0	10.0	20.0	58.4	0.00
Nutrition	2.7	97.3	90.0	10.0	222.211	0.00	3.0	97.0	0.0	3.0	97.0	0.00	1.00
Child activity	80.5	19.5	90.3	9.7	192.706	0.00	70	30.0	80.0	10.0	10.0	77.46	0.00
Preparation before chemotherapy	5.0	95.5	80.0	20.0	222.046	0.00	6.0	94.0	0.0	6.0	94.0	0.00	1.00
Care during and after chemotherapy	11.0	89.0	94.0	6.0	222.035	0.00	12.0	88.0	0.0	12.0	88.0	0.00	1.00

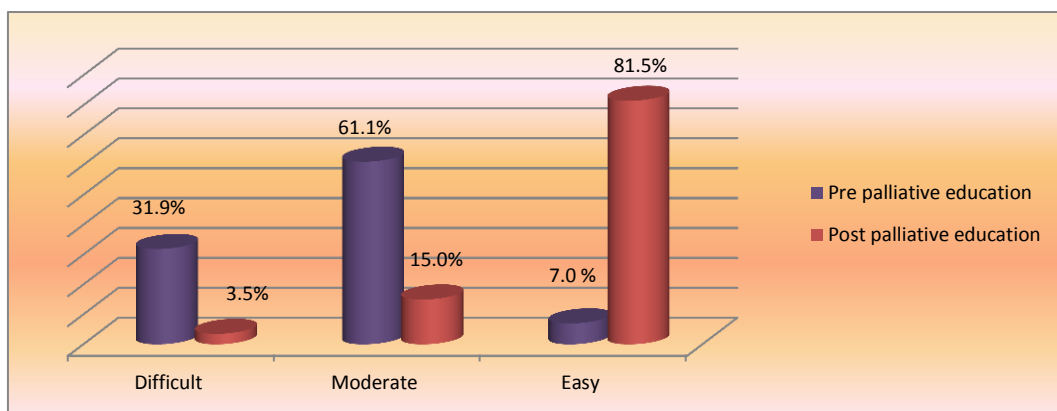
**Figure (3):** Percentage distribution of the studied student's in (study / control group) according their total attitude toward care of children with cancer (pre/post (n=226)).



**Figure (4):** Percentage distribution of the studied student’s in (study / control group) according their total practice toward care of children with cancer (pre/post (n=226).



**Figure (5):** Percentage distribution of the studied students in the study group according to their total level of acceptability scale for palliative care simulation



**Table (6):** Comparison of total knowledge, behavior, and practice scores of students regarding care children with cancer through palliative education phases (n=226).

Items	Study group (n=113)				X <sup>2</sup>	P value	Control group (n=113)				X <sup>2</sup>	P value
	Pre palliative education		Post palliative education				Pre palliative education		Post palliative education			
	No	%	No	%			No	%	No	%		
<b>Total knowledge</b>												
Satisfactory	9	8.0	113	100.0	192.65	0.00	12	10.6	18	15.9	1.384	0.239
Un satisfactory	104	92.0	0	0.0			101	89.4	95	84.1		
<b>Total attitude</b>												
Positive	17	15.0	101	89.4	43.14	0.00	18	15.9	23	20.4	2.475	0.348
Negative	96	85.5	12	10.6			95	94.1	90	70.6		
<b>Total practice</b>												
Good	0	0.0	98	86.7	174.05	0.00	0	0.0	40	30.0	129.02	0.000
Average	90	79.6	15	13.3			44	38.9	39	34.7		
Poor	23	20.4	0	0.0			69	61.1	34	35.3		

**Discussion**

A palliative care simulation-based experience (SBE) with an end-of-life scenario (EOL) has the potential to help and encourage the development of palliative care nurses by addressing and supporting their requirement for experience in caring for dying children (Hedenstrom et al., 2021). Nursing students are unable to provide palliative care and need accurate information to participate in caring for children with cancer. Nursing

students must have palliative care knowledge and practice for effective delivery of equitable and high quality palliative care to seriously ill and dying children (Jawabreh and Ayed, 2019). So, this study aimed to evaluate the effect of palliative care education on pediatric nursing student performance regarding children with cancer: An end of life simulation.

Concerning the student age, the present study illustrated that, majority of the study and control groups

had an age between 20-22 years old with, mean age of  $20.61 \pm 0.59$ . In relation to student gender, nearly two thirds of the study and control groups were females. This study agreement with *Soliman, (2017)* who founded that, 43.3% of them at the age group from 20-30 years with mean score of  $26.05 \pm 2.16$  years, 51.7% of them were female. Also, this study accordance with *Rattani, et al.(2020)* who found that, (83.3%) were female and (11.9%) were male students. Also, (57.1%) were in the age range of 23–27 years.

Regarding the studied nursing students' knowledge about cancer, the present study illustrated that, a highly statistically significant improvement in knowledge for the studied student regarding define, etiology, clinical manifestation, stages, diagnosis and treatment of cancer at the post palliative education as compared to pre palliative education ( $P < 0.001$ ). This study result on the same wavelength with *Kapucu and Bulut, (2018)* who reported that 65.9% the studied nursing students' had lack of knowledge and experience that led them to have difficulty working with cancer children. Also, the study findings in agreement with *Hedenstrom et al. (2021)* who clarified that, previous educational interventions related to cancer help to support students' cancer care knowledge after intervention application.

Regarding the studied nursing student's knowledge about end life stage, the current study illustrated that, a highly statistically significant improvement in knowledge for the studied student regarding needs of children and care of children in end stage of life at the post palliative education as compared to pre palliative education ( $P < 0.001$ ). This result supported by *Li et al. (2019)* who clarified that, more than half of the students (54.1%) in a need for improved end-of-life care education and suggest education through a simulation focused on end-of-life care. Also, this result is in accordance with *Rattani et al. (2020)* who represented that the students' knowledge was significantly improved after simulation with ( $P = 0.007$ ). Also, the result of *Laird, (2020)* who demonstrated that, the knowledge score increased from the pre-test ( $M = 71.83$ ,  $SD = 22.04$ ) to the post-test ( $M = 81.75$ ,  $SD 15.68$ ) in a statistically significant way ( $p < .05$ ). Moreover, in consistent with *Tamaki et al. (2019)* who found that, the students' knowledge improved significantly ( $p = 0.000$ ) after simulation. This may be due to the students' need to learn about end of life stage care which may facilitate their providing better support for children and families.

As regard the studied student's knowledge of children grief in end life stage, the present study clarified that a highly statistically significant improvement in knowledge for the studied student regarding define, clinical manifestation, stage of grief and methods of decrease children fear at the post palliative education as compared to pre- palliative education ( $P < 0.001$ ). This result in consistent with *Khalaf et al. (2018)* who suggested that repeated grief strategies education increase nurses' ability to deal with grief of children. This may be due improved nursing students' knowledge which led to increase their ability for supporting children with cancer.

The present study result regarding students' palliative care quiz illustrated that, the majority (86.4.0% & 83.0 %) of study & control groups had poor level of knowledge regarding palliative care for children with cancer in the pre palliative education. While, nearly

two thirds (64.1%) of study group had excellent level of knowledge in the post palliative education. This result in accordance with *Hafiz, (2017)* who reported that a deficiency in students' palliative care knowledge preprogram application. But, there was a statistically significant improvement ( $P \leq 0.001$ ) in their knowledge after program intervention. Also, in consistent with *Ismail et al. (2017)* they found that, students' knowledge regarding palliative care was inadequate. Although there was a significant difference in their palliative care knowledge ( $p = 0.011$ ) between the students who had received palliative care sessions and those who had not with mean score = 7.50. Additionally, in agreement with *Etafa et al. (2020)* who revealed that, the majority of the study participants had an inadequate level of knowledge about palliative care in preprogram. Meanwhile this study agreement with *Abuhammad et al. (2020)* who found that, there was significant improvement in nursing total knowledge after receiving palliative educational intervention. This may be because the students acquired their knowledge regarding palliative care through their curriculum.

Investigating the studied student's total knowledge related to palliative care in children with cancer the present study result showed that, the majority (100%) of study group had satisfactory knowledge regarding palliative care in the post palliative education as compared to pre palliative education. While, more than three quarters (84.1% & 89.4%) of control group had unsatisfactory knowledge regarding palliative care in the pre and post palliative education. The finding of current study supported by *Valen et al.(2021)* who clarified that, there was a positive significant differences ( $P < .0001$ ) in the students' total palliative care knowledge between pre- and post-simulation. Also, agreed with *Rattani et al. (2020)* who revealed that, the use of high-fidelity simulation to teach palliative care for undergraduate nursing improved their total knowledge. Moreover, on the same line with *Jawabreh et al.(2019)* who coincided that, there was statistically significant increase ( $p = 0.001$ ) in students' total knowledge with mean score of pre-course was  $4 \pm 3.0$ , and post-course was  $18 \pm 2.0$ .

Additionally, in agreement with *Randall et al. (2018)* who reflected that improvement in students' understanding and confidence in delivering palliative and end-of-life care. The present study result also in accordance with *Smith et al. (2018)* who stated that, use of simulation supported the development of competencies for nursing students providing palliative and end of life care. This may be due to effect of use of high fidelity simulation for teaching undergraduate student nurses.

On the attempt to assess the studied student's total attitude toward care of dying children the current study clarified that, the majority (89.4%) of the study group had positive attitudes towards care of children with cancer in the post palliative education as compared to pre palliative education. This result supported by *Zhou et al. (2021)* who clarified that, the most students had a positive attitude towards caring for the dying children with mean score of 101.34. Also, coincided with *Hedenstrom et al. (2021)* who proposed that the educational program removed students' fear and created a positive image of cancer leading to improvement of students' attitude toward children with cancer.

Moreover, in agreement with *Rattani et al. (2020)* who found that the attitudes of undergraduate nursing

students concerning the care of dying children were improved by high fidelity simulation. Additionally, the study's findings showed that following the intervention, the participants' negative views significantly improved ( $P < 0.05$ ). Also, agreed with *Laird, (2020)* who demonstrated that the students' attitude scores increased from the pre-test with ( $M = 64.93$ ,  $SD = 21.04$ ) to the post-test with ( $M = 75.35$ ,  $SD 15.09$ ), which is statistically significant ( $p < .05$ ). Similarly with *Kapucu & Bulut,(2018)* who stated that, 85.3% of the students found it was difficult to provide care to children with cancer due to lack of knowledge and experience regarding care of children with cancer. This confirmed that the more experience student has, the higher was the positive attitude toward cancer.

Concerning the studied students' practice toward care of children with cancer, the present study demonstrated that, the majority (86.7%) of study group had good practice in the post palliative education as compared to pre palliative education. While, less than one quarter (61.1%) of control groups had poor practice in the pre and post palliative education. This result supported by *Uslu et al. (2019)* who clarified that, there was an increased in students' skills regarding chemotherapy administration post simulation and the simulation is considered to be an effective method for safe medications administration. These findings supported by *Jang et al. (2021)* who showed that, there was a statistically significant improvement in clinical performance of the experimental group ( $p < 0.001$ ) pre- and post-study scores analyses. Similarly, with *Haddeland et al. (2021)* who revealed that, there was an increase in the intervention group skill performance post simulation with statistically significant difference ( $p < 0.0001$ ).

Concerning studied student total knowledge, behaviors, and practice score, the current study presented that, a highly statistically significant difference ( $P$ -value  $< 0.001$ ) between study and control group at the pre and post implementation of palliative education concerning their total knowledge, behaviors, and practice score. on the same wave with *Frey et al. (2020)* who reported that, there was an improvement in the students' level of skills post educational intervention. Also, in consistent with *Tamaki et al. (2019)* who demonstrated that there was a significant performance improvement ( $p = 0.000$ ) in the simulation group after simulation education. In compact with *Mohamed & Fashafsheh, (2019)* who showed that there was statistically significant improvement ( $p = 0.001$ ) in practice scores of students after participation in the simulation program. Also, in agreement with *D'Souza et al. (2017)* who suggested that the use of high-fidelity simulation improved students' performance and develop safe practice.

### Conclusion

Based on the results of the present study, it can be concluded that, implementation of the palliative care education is a highly effective method to improve pediatric nursing student knowledge, behaviors, and practice. There is a highly statistically significant difference ( $P$ -value  $< 0.001$ ) between study and control group at the pre and post implementation of palliative education concerning their total knowledge, attitude and practice score.

### Recommendations:

- Application of standardized simulation concerning palliative care for children with chronic disease for more reality situation and improvement students' quality of palliative care.
- Implementation further study of web-based educational programs for nurses regarding palliative care of children with cancer as it considered a method of learning at any time available for them.

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