Competency Based Learning Guideline for Nurses Caring Pediatric Patients with Leukemia Regarding Using the Non-Pharmacological Pain Relief

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Abstract

Background: Oncologic pediatric patients receiving chemo/ radiotherapy expose to various pain experiences either related to critical illness, procedures or therapies. **Aim:** To investigate the effect of competency based learning guideline for nurses caring pediatric patients with leukemia regarding using the non-pharmacological pain relief and relieve pain of pediatric patients with leukemia through applying non-pharmacological methods. **Design:** A quasi-experimental design was utilized. **Setting:** Pediatric Tumor/ Cancer Care Unit affiliated to the New Pediatric hospital / Ain Shams University Hospital. **Subject:** A purposive sample of 80 nurses registered from 3 years who are caring with pediatric patients with leukemia, beside 80 pediatric patients with leukemia. **Tools:** Predesigned interviewing questionnaire to assess demographic characteristics of the nurses and children, knowledge of nurses regarding using non-pharmacological pain relief, observational checklist to assess practice of nurses and Pain scale to assess pain severity of the pediatric patients with leukemia. **Results:** The most of nurses had good knowledge, competent practice and positive attitude towards using non-pharmacological pain relief methods after guideline implementation. There was statistical significant difference between total knowledge, practice of nurses toward non-pharmacological pain relief and total attitude of pediatric patients with leukemia. **Conclusion**: Competency based learning guideline had a positive effect on relieving pain of pediatric patients with leukemia where nurses had good knowledge, positive attitude and performed competent practice towards using non-pharmacological pain relief after guideline implementation. **Recommendation:** Continuous education, feedback, assessment/ reassessment, and monitoring to retain the gained improvement in knowledge and skills of nurses caring for leukemic pediatric patients using updated nursing care strategies.

Keywords: Leukemia, Non-Pharmacological Pain Relief, Competency Based Learning, Pediatric Patients, Nursing

Introduction

The incidence of childhood cancer has been gradually increasing. The overall incidence of childhood cancer worldwide ranges from 50 to 200 cases/year per million children. The diagnosis of cancer, lengthy of hospital stays, various invasive treatments, and chemotherapy can result in pain **(Li et al., 2023).**

Pain is an unpleasant sensation that child is going to experience due to leukemia or certain procedures performed in hospital stay **(Raja, 2020).** Despite extensive research and education over the last decade, the assessment and treatment of pain in leukemic children remain challenging with potential long-term consequences. Relief of pain and suffering, whenever possible, is an important responsibility of nurses caring for children with leukemia **(Kaplan, 2019).**

Pain management involves measures to promote child patients' comfort and wellbeing and such actions lead to health promotion during treatment and hospital admission **(World Health Organization**, **2018).** Psychological interventions for childhood cancer beside the new medical advanced intervention reinforce coping strategies as non-pharmacological relieves management of pain which increase self-awareness and self-belief, relaxation and distraction **(Satapathy et al., 2018).**

Non-pharmacological pain therapy refers to interventions for pain relief without medications to decrease fear, distress, anxiety and pain. The advantage of non-

pharmacological pain management is that they are relatively inexpensive and safe **(El Geziry et al., 2018).**

There are various physical techniques of non-pharmacological pain relief for pediatric patients with leukemia as physical activity adaptation, some therapies like (yoga, music and art), clinical dialogue, visual imagination, medical play, structured drawing, free drawing, dramatization and nondirective play therapy, self-expression through movement, video games, walking, bike riding, ball games, throwing games, racquet sports and enhanced physical exercise to manage psychological disturbances like anxiety, sleep, cognitive fatigue and quality of life of pediatric patients with leukemia **(Satapathy et al., 2018).**

Understanding the terminology associated with diagnosis and treatment provides a framework for nurses to give specialized care for children with leukemia **(Colby-Graham & Chordas, 2018).** So, nurses need to continuously update their knowledge and practical techniques during care for children with leukemia **(Bindon, 2017).** Methods and procedures of teaching could contribute to the successful development of the general and specific competences of nursing care hence there is necessity to follow the competency based learning guideline in caring for pediatric patients with leukemia **(Hockenberry & Wilson, 2013).**

Competency cannot be achieved by using traditional strategies but could be with more effective forms of teaching and learning strategies that encourage active using of non-pharmacological pain relief **(Močinić et al., 2021).** These strategies include online and blended learning, dual enrollment, project-based, community-based learning and credit recovery that lead to better nurses' engagement **(Miller et al., 2020).**

Significance of the Study

The incidence of childhood cancer has been gradually increasing. The overall incidence of childhood cancer worldwide ranges from 50 to 200 cases/year per million children. The diagnosis of cancer, lengthy of hospital stays, various invasive treatments and the side effects of chemotherapy, such as pain, nausea, fatigue, vomiting and hair loss. Non pharmacological pain relief as play-based occupational therapy to children effectively reduced pain, anxiety, and fatigue among all hospitalized children **(Rongrong Li, et al., 2023).** It is clear nurse`s important role in pain evaluation and management of the pediatric patient with leukemia, especially non-pharmacological management. Therefore, competency based learning guideline for nurses caring pediatric patients with leukemia using the non-pharmacological pain relief can contribute the better prognosis and relieving pain of children with leukemia.

Aim of the Study:

This study aimed to evaluate the effect of competency based learning guideline regarding non-pharmacological pain relief for nurses caring pediatric patients with leukemia through:-

• Assessing nurses' caring for pediatric patients with leukemia regarding their level of knowledge, practice and attitude about non-pharmacological pain relief pre and posttest.

• Designing and implementing competency based learning guideline for nurses caring pediatric patients with leukemia based on their assessed needs.

• Evaluating the effect of competency based learning guideline on nurses caring pediatric patients with leukemia and pediatric patients with leukemia.

Research Hypothesis:

• The competency based learning guideline improved knowledge, practices and attitude of nurses caring pediatric patients with leukemia and contributed to relieve pain of pediatric patients with leukemia.

Material and Methods

Research design:

A quasi-experimental design was utilized in this study.

Setting:

This study was conducted at Pediatric Tumor/ Cancer Care Unit affiliated to the New Pediatric hospital / Ain Shams University Hospital/ Cairo.

Sampling:

A purposive sample of 80 registered nurses who are caring with pediatric patients with leukemia. Beside 80 pediatric patients with leukemia, 39 of them aged 3 ≤8 years and 41 aged more than 8 years.

Inclusion criteria:

- Newly registered nurses (1 to 3 years)
- Registered nurse with experience more than 3 years.

Tools of data collection:

Data was collected through using the following tools:

A-Pre-designed Interviewing Questionnaire:

Part I: Demographic characteristics of the nurses such as age, gender, level of education and years of experience.

Part II: Demographic characteristics of the children such as age, gender, level of education, child order in family.

Part III: Knowledge of nurses about pain of pediatric patients with leukemia and non-pharmacological methods of pain relief pre and post implementation of the guideline.

The first tool of data collection was the pre-designed interviewing questionnaire. It was designed to gather the data regarding children, nurses' characteristics and knowledge of nurses about pain of pediatric patients with leukemia and non-pharmacological methods of pain relief (pre/ post implementation of the competency guideline).

Items of nurses' knowledge regarding pain of pediatric patients with leukemia and non-pharmacological pain relief contained closed ended questions as causes, symptoms & physiology of pain in pediatric patients with leukemia, methods of non- pharmacological pain relief and the effectiveness of pharmacological and non-pharmacological methods of pain relief.

Scoring system:

Items of nurses' knowledge non-pharmacological pain relief consisted of closed ended questions. According to nurses' responses, each question is checked either correct (1 score) or incorrect (zero). The score were classified into correct (>75%), and incorrect (< 75%).

Part IV: Practices of nurses about non-pharmacological pain relief.

The second tool was observational checklist that was adapted from **El Geziry, et al., (2018)** to assess practices of nurses toward pain of children with leukemia using methods of non-pharmacological pain relief (pre and post implementation of the competency guideline.). Practices of nurses toward non-pharmacological pain relief for pediatric patients with leukemia were distraction (Video games, TV, movies, phone), relaxation techniques (breathing, meditation), Guided imagery and application of hot and cold compresses. Each step is checked either competent (1 score) or incompetent (zero). Then the total practice was scored competent (≥85%) and incompetent (<85 %).

B- Pain scale: to assess attitude of the pediatric patients with leukemia pre and post implementation of the guideline.

The third tool was Wong-Baker FACES pain rating scale that was adapted from **Wong & Baker (2012)** to assess attitude of the pediatric patients with leukemia pre and post implementation of the competency guideline. Faces show the level of pain in children aged less than 8 years old caused by leukemia. The face (0) shows no pain. Then show the pain level gradually increasing as the number increases. A scale of 10 indicates that the pain is very severe. Children or caregivers are asked to point to the face that represents the level of pain they are currently experiencing. Score of less than 60% was hurts little bit and the score between 60% to less than 75% was hurts even more and equal or more than 75% was hurts worst (pre/ post nursing intervention).

Moreover, **The Oucher Pain Scale,** available in five different ethnic pictures, draw a spectrum of facial expressions, which are useful for pain assessment in children age 8 and above, that was adapted from **Welsh, (2016)** and include face scales.

The study tools was assessed and ascertained by a panel of five experts in Pediatric Nursing Department/ Ain Shams University to validate its consistency, accuracy and relevancy.

Pilot study:

A pilot study was carried out, involving 10% (8) of nurses caring pediatric patients with leukemia and 10% (8) of pediatric patients with leukemia and they were excluded from the study sample later. It helped in modification of the study tools, where some items were corrected, omitted and added as necessary.

Field of the work:

The actual field work was carried out for 6 months from the first of October 2023 to the end of March 2024. The researcher was available in the study setting by rotation during morning shift two days per week to assess nurses' knowledge, practice towards non-pharmacological pain relief and pain of pediatric patients with leukemia. The average time needed for the completion of the study tools was approximately 30-40 minutes. Each nurse and pediatric patient was assessed, observed and evaluated using the study tool which filled by the researcher.

The data collected were organized, revised, coded, tabulated and statistically analyzed by using computer program (SPSS) version 20. Descriptive statistics like mean and percentage were used to analyze the data. Means, standard deviation ($\overline{X}$±SD) and chi-square test (χ^2) were used in the study. Proportion probability of error (P value) was used. Significance of the results was considered at $p < 0.05$.

Results

Table (1) revealed that $\overline{X}$±SD of the nurses' age was 24.15±3.61. 80% of them were females. Also, 45% of them had high institute of nursing, nearly 70% of them had less than 3 years of experience.

Table (2) revealed that $\overline{X}$±SD of children's age was 8.6±3.77. 50% of the studied children aged 8- < 12 years old; 60 % of them are males. 50% are in the primary school.

Table (3), illustrated that 80% of children receive chemotherapy/ radiotherapy. 90% have side effects from the care as sore throat, bone pain, burn pain, nerve pain and inflammation. Pain handles the daily activities of 75% of them.

Table (4) showed that there was statistical significant difference between knowledge of nurses about pain and non-pharmacological methods pre/ post implementing the guideline (P-value <0.001*).

Figure (1) showed that, 86.25% of the nurses have correct knowledge post implementation of the competency based learning guideline compared to 26.25% of them have knowledge pre implementation of the competency based learning guideline (P-value <0.001**).

Regarding pediatric nurses practices toward non-pharmacological pain relief, table (5) showed that there was statistical significant difference between practices of nurses about non-pharmacological methods pre/ post implementing the guideline (P-value <0.001*). Also distraction, listening to music and applying hot and cold compresses were the most effective methods of non-pharmacological pain relief.

Regarding total practices of nurses toward non-pharmacological pain relief for pediatric patients with leukemia, as noticed from **figure (2),** 30 % of the nurses have competent practice pre implementing the competency guideline compared to 90 % of them have competent practice post implementing the competency guideline (P-value <0.001**) .

Table (6) showed that**,** in pediatric patients with leukemia aged 3 ≤ 8 years old, there is no statistical significant difference between pain of children pre/ post implementing

the competency based learning guideline (P-value=0.164).

On the other hand**, Figure (3)** illustrated that there is observed improvement in pain relief of children more than 8 years old toward pain, pre/ post implementing the competency guideline.

Table (7) showed that there was statistical significant difference between total knowledge, practice of nurses toward non-pharmacological pain relief and total attitude of pediatric patients with leukemia pre/ post implementing the competency guideline (P-value=<0.001*)

Table (1): Number and percentage distribution of demographic characteristics of the pediatric nurses (n= 80).

Demographic characteristics of the pediatric nurses		Number n= 80	Percentage
Nurses' age (in years)	20- < 25	32	**40**
	25- < 30	24	30
	30- < 40	16	20
	Other	8	10
	$\bar{x}$±SD 24.15±3.61		
Gender	Male	16	20
	Female	64	**80**
Level of education	Nursing diploma	32	40
	High institute of nursing	36	**45**
	Bachelor degree	8	10
	Postgraduate degree	4	5
Years of experience	< 3 years	56	**70**
	> 3 years	24	30

Table (2): Number and percentage distribution of demographic characteristics of the children (n= 80).

Demographic characteristics of the pediatric patients with leukemia		Number n= 80	%
1- Child's age (in years)	4- < 7	32	40
	8- > 12	41	**50**
	Other	7	10
$\bar{x}$± SD 8.6±3.77			
2- Gender	Male	48	**60**
	Female	32	40
3- Child's order in family	First	24	30
	Second	16	20
	Third	32	**40**
	Other	8	10
4- Educational level	Preschool	32	40
	Primary school	40	**50**
	Preparatory school	8	10

Table (3): Number and percentage distribution of past history and pain of the children (n= 80).

Past history and pain of the pediatric patients with leukemia		Number (n= 80)	%
5-The child receives chemotherapy/radiotherapy	Yes	64	**80**
	No	16	20
6- The child has side effects from the care as sore throat, bone pain….	Yes	72	**90**
	No	8	10
7-Leukemic child has a burn pain, nerve pain, nerve inflammation	Yes	64	**80**
	No	16	20
8-Pain handle the child daily activities	Yes	60	**75**
	No	**20**	**25**
9-Leukemic child has a severe pain which prevent daily activities as playing?	Yes	72	**90**
	No	8	10

Table (4): Number and percentage distribution of the pediatric nurses according to knowledge/attitudes about pain and non-pharmacological methods (n= 80).

Knowledge about pain and non-pharmacological methods of pain relief	Pre		Post		Chi-square	
	N	%	N	%	X^2	P-value
1- Causes of pain	18	22.5	66	82.5	57.744	<0.001*
2- Symptoms of pain	24	30	67	83.75	47.116	<0.001*
3-Doctors avoid medication relieve pain to avoid misuse/ addiction	16	20	68	85	67.769	<0.001*
4- Nurses attitudes towards pain	17	21.25	70	87.5	70.767	<0.001*
5- Physiology of pain	15	**18.75**	72	**90**	81.852	<0.001*
6- Pain medication	20	25	69	86.25	60.794	<0.001*
7- Sociology and psychology of pain	22	27.5	73	91.25	67.394	<0.001*
8- Non-pharmacological pain relief can be effective.	26	**32.5**	74	**92.5**	61.440	<0.001*
9- Patients may sleep in spite of severe pain.	20	25	72	90	69.156	<0.001*
10- Nonsteroidal anti-inflammatory agents are not effective analgesics for pain.	18	22.5	73	91.25	77.082	<0.001*
11- Children less than 11 years old cannot reliably report pain.	17	21.25	65	81.25	57.636	<0.001*
12- Choice of analgesic medications	23	28.75	74	92.5	68.100	<0.001*
13- Useful medication for treatment of leukemic pain	20	25	72	90	69.156	<0.001*

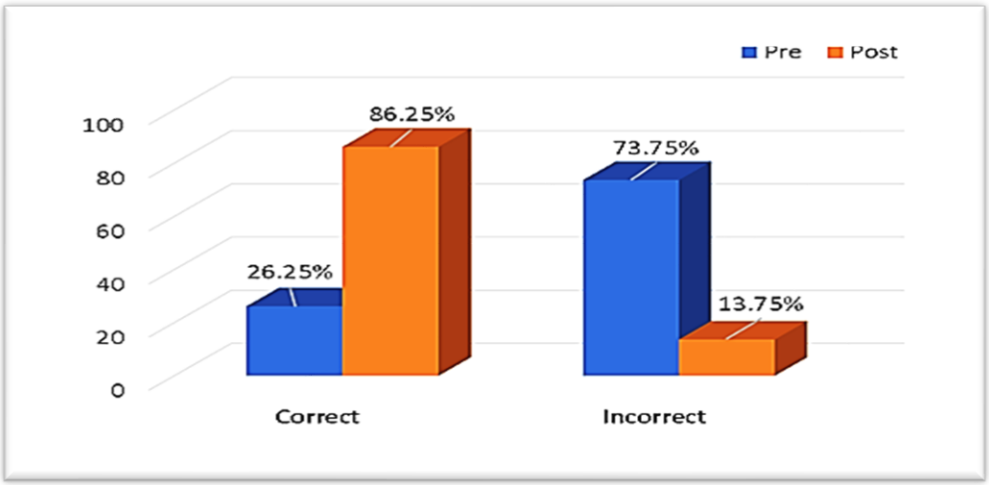

Figure (1): Number and percentage distribution of nurses according to their knowledge about pain of pediatric patients with leukemia and non-pharmacological methods of pain relief pre and post (n= 80).

Table (5): Number and percentage distribution of the pediatric nurses practices toward non-pharmacological pain relief **(El Geziry et al., 2018).**

Practices of nurses toward non-pharmacological pain relief	Pre		Post		Chi-square	
	Competent		Competent			
	N	%	N	%	X^2	P-value
1-Explain, educate and Psychological preparation	26	32.5	71	88.75	53.019	<0.001*
2-Distract attention by Video games, TV, movies, phone	24	30	74	**92.5**	65.833	<0.001*
3-Apply Relaxing techniques (breathing, meditation, etc.)	21	26.25	68	85	55.933	<0.001*
4-Listen to music	23	28.75	75	**93.75**	71.205	<0.001*
5-Use guided imagery	21	26.25	72	90	66.789	<0.001*
6-Massage	25	31.25	71	88.75	55.104	<0.001*
7- prepare children for procedures at an appropriate developmental level	26	32.5	70	87.5	50.417	<0.001*
8- Maintain proper body alignment to reduce stress anxiety (Positioning)	28	35	74	92.5	57.228	<0.001*
9-Apply hot and cold compresses	27	33.75	73	**91.25**	56.427	<0.001*

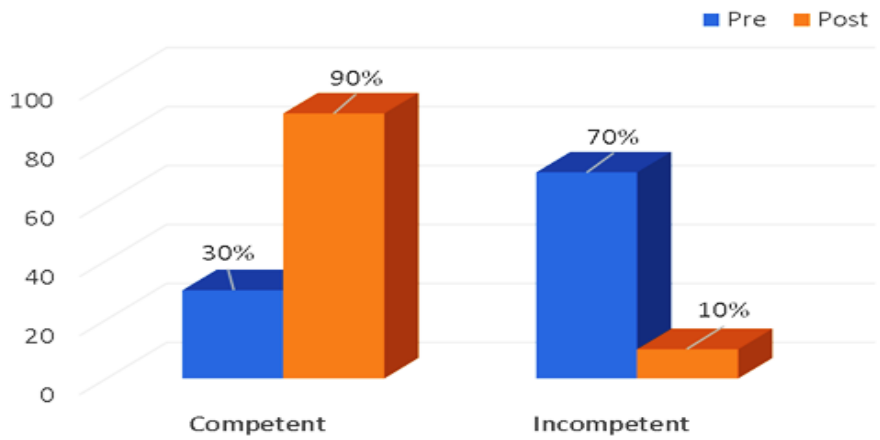

Figure (2): Distribution of nurses according to total practices toward non-pharmacological pain relief.

Table (6): Total attitude of the pediatric patients aged 3 ≤ 8 years old with leukemia pre and post implementation of the guideline (n=39).

Wong-Baker FACES pain rating scale (3 ≤ 8 years old)	Pre		Post		Chi-square	
	N	%	N	%	X^2	P-value
Hurts little bit (2)	5	**12.8**	11	**28.2**	3.614	**0.164**
Hurts even more (6)	12	30.8	13	**33.3**		
Hurts Worst (10)	22	56.4	15	**38.5**		
Total	39	100	39	100		

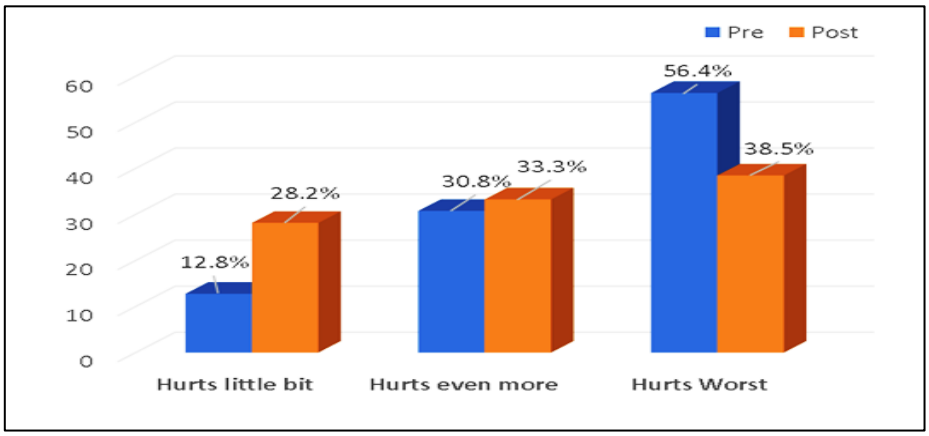

Figure (3): Total attitude of the pediatric patients aged more than 8 years old with leukemia pre and post implementation of the guideline (n=41).

Table (7): Correlation between Total Knowledge & Practice of nurses toward non-pharmacological pain relief and Total Attitude of pediatric patients with leukemia (n=80).

Total Knowledge & Practice of nurses toward non-pharmacological pain relief	Total Attitude of pediatric patients with leukemia			
	Pre-program		Post program	
	r	P-value	r	P-value
Total Knowledge	0.427	<0.001*	0.372	<0.001*
Total Practice	0.384	<0.001*	0.425	<0.001*

Discussion

Diagnosis with leukemia and admission to hospital receiving chemo/ radiotherapy exposes pediatric patients to various pain experiences, either due to critical illness, procedures or therapies **(Grunauer et al., 2021).** So, this study aimed to relieve oncologic pediatric pain through applying non-pharmacological methods for nurses caring pediatric patients with leukemia.

Regarding demographic characteristics of the pediatric nurses, the current study showed that, two fifths of them aged between 20- < 25 years old, the majority of them are females and nearly half of them have high institute of nursing **(Table 1)**. These results were supported by **Maala & Ahjil, (2016),** study which entitled "Evaluation of Nurses' Practices toward Pain Management of Leukemic Child under Chemotherapy in Baghdad" who stated that most of nurses' ages were 20-24 years; two thirds of them were female and graduated from nursing institute. From the researcher point of view, this similarity may be due to the age of graduation and the caregivers from nurses mostly are females.

Regarding demographic characteristics of the pediatric patients with leukemia, the current study reflected that half of the studied children aged 8- < 12 years old, 60 % of them are males. Half of them are in the primary school **(Table 2).** This result is supported by **Akard et al., (2015),** study which entitled " Digital storytelling: An innovative legacy-making intervention for children with cancer" in Monroe Carell, USA who stated that the majority of children with leukemia during the study were within the age range of 60-180 months and males. This similarity may be that the most common age of leukemia diagnosis is between 6-12 years old.

Regarding past history and pain of the studied children with leukemia, **(Table 3)** illustrated that, three fifths of them have surgery before; the majority of them receive chemotherapy/ radiotherapy. Most of them have side effects from the care as sore throat and inflammation. This result is in accordance with **Mora et al., (2023),** study entitled "Supportive care for cancer-related symptoms in pediatric oncology: a qualitative study among healthcare providers" who estimated that the most of children with cancer hospitalized receive chemotherapy having pain and nearly half of

them claim their pain as intense. In addition, children who are treated in outpatient, pain is present in nearly one third of the cases. This accordance is due to the diagnosis and treatment of leukemia is very painful.

The current study illustrated that most of studied children have side effects from care as sore throat, bone pain, burn pain, nerve pain and inflammation. This result is supported by **Chokshi et al, (2017),** study which entitled "Predictors of acupuncture use among children and adolescents with cancer" at Columbia University Medical Center who reported that beside to pain in children with leukemia, other symptoms can occur such as nausea, vomits, anxiety, fatigue, loss of appetite, weight loss, constipation or diarrhea, mucosa lesions, difficulty of deglutition, phobia, fear, uncertainty, irritability, weakness or lack of energy, difficulty of concentration, sleep and mood disorders, numbness and tingling.

Regarding knowledge of nurses toward pain of pediatric patients with leukemia and non-pharmacological pain relief, the current study illustrated that one fourth of them have knowledge about pain assessment and pain relief compared to most of them have good knowledge post implementation of the competency based learning guideline **(Figure 1)**. The results agree with the finding of the study conducted by **(McCaffery & Robinson, 2018)** in study which entitled **"**Your patients are in pain; Here's how you respond" who reported that nurses had poor knowledge about pain management which led to lack of pain management practices provided for the child with pain attack. The researcher believed that improving knowledge develops the patient health outcomes.

Regarding pediatric nurses practices toward non-pharmacological pain relief, (**Table 5)** showed that distraction, listening to music and applying hot and cold compresses were the most effective methods of non-pharmacological pain relief. This study result is in accordance with **Satapathy et al., (2018),** in a study entitled **"**Non-pharmacological Interventions for Pediatric Cancer Patients: in India who stated that there are various techniques of non-pharmacological pain relief for pediatric patients with leukemia as yoga, music and art, clinical dialogue, visual imagination, medical play, structured drawing, self-expression, video games and walking . The researcher believed that non-pharmacological pain relief is essential to manage psychological disturbances like anxiety, sleep, cognitive fatigue and quality of life of pediatric patients with leukemia**.**

Regarding total practices of nurses toward non-pharmacological pain relief for pediatric patients with leukemia **(Figure 2)**, the current study showed that less than one third of the nurses have competent practice pre implementing of the competency guideline compared to most of them have competent practice post implementing the competency guideline. This result is in accordance with **Coluzzi et al., (2020),** in study which entitled "Pain Management in Childhood Leukemia: Diagnosis and Available Analgesic Treatments" who reported that the majority of nurses are not meeting standards of care in the management and documentation of cancer- related pain and did not meet their child's pain goals.

Regarding attitude of the pediatric patients with leukemia aged 3 ≤ 8 years old toward pain, the current study showed that there is no statistical significant difference between pain of children pre/ post implementing the competency based learning guideline (P-value=0.164). (**Table 6**). This result is in contrary with **Fuller et al. (2022),** in study which entitled **"**Assessment and management in pediatric intensive care units around the world**"** who suggested that the complementary treatment helped to control pain, diminishing the drug's adverse effects, controlling other symptoms beside pain such as nausea and vomits, fatigue and tiredness. Consequently, the complementary treatment increased the child's ability to promote weight gain, sleep and mood patterns. This contrary may be due to decreased children age and compliance with non-pharmacological and pain medications.

Regarding pain intensity in pediatric patients with leukemia aged more than 8 years old toward pain (**Figure 3)**. This study showed that using the Non-pharmacological methods can contribute to relieve pain in leukemic patients. This result is supported by **Pölkki et**

al. (2022) in study which entitled **"**Parents' role in using non-pharmacological methods in their child's postoperative pain alleviation" who discovered that parents of hospitalized children (aged 8 to 12 years) with leukemia believed that their children were experiencing severe pain and more likely to report using non pharmacological interventions to relieve pain. The researcher believed this accordance is that the non-pharmacological pain relief is the golden relief for the pediatric patients with leukemia.

Conclusion:

In the light of the present findings, it can be concluded that knowledge and practices of nurses regarding non-pharmacological pain relief methods improved after implementing of competency based learning guideline with statistical significant difference between pre and post guideline (P-value <0.001**), so competency based learning guideline has a positive effect on relieving pain of children with leukemia. Further studies in pain management should involve a multidisciplinary team to ensure assessment and interventions tailored to the individual patient.

Recommendations:

Continuous education, feedback, assessment/ reassessment, and monitoring to retain the gained improvement in knowledge and skills of nurses caring for leukemic pediatric patients using updated nursing care strategies.

Ethical Clearance – The research approval was obtained from the Scientific Ethical Research Committee, Faculty of Nursing /Ain Shams University. An oral approval to carry out the study was taken from each nurse/child parent in the study sample. Nurses were assured that all the gathered data will be treated confidentially. Nurses were also informed about their right to withdraw from the study at any time without giving any reason.

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