

## Effect of an Educational Training Program on Nurses' Pain Assessment at Zagazig University Pediatrics Hospital

Asmaa Ahmed Salem Ahmed<sup>(1)</sup> Amal Mohamed EL-Dakhakhny<sup>(2)</sup>, & Samah EI – Awady Mohamed<sup>(3)</sup>,

<sup>(1)</sup> Msc, In Pediatric Nursing-Faculty of Nursing-Zagazig University. <sup>(2)</sup> Prof of Pediatric Nursing- Faculty of Nursing-Zagazig University, <sup>(3)</sup> Assist. Prof of Pediatric Nursing-Faculty of Nursing- Zagazig University,

### Abstract

**Background:** Pain refers to an unpleasant, distressful and uncomfortable feeling, and it is the most frequent nursing diagnosis and the more common problem for which patients in the clinical setting seek help. **Aim of the study:** the study aimed to evaluate the effect of an educational training program on nurse's pain assessment. **Subjects & method: Research design:** A quasi experimental design was used in the present study. **Subjects:** The subjects of this study included 65 nurses. **Setting:** The study was conducted at different pediatrics units including PICU, dialysis, general pediatric unit, cardiology and hematology and oncology units at Zagazig University pediatric Hospital. **Tools for data collection:** Two tools were used. **Tool one** was a structured interview questionnaire sheet to assess nurse's knowledge. **Tool two** was an observational checklist for nurse's practice. An educational program was developed to educate the studied nurses about pain assessment scales. **Results:** revealed that the studied nurses' knowledge (100 %after vs. 60 % before) and practices had been improved significantly after implementation of the educational program either immediately or 2 months later than before the program. **Conclusion:** the educational program had improved the studied nurses' knowledge and practice about pain assessment. **Recommendations:** Based on the results of the present study nurses should have adequate training programs on pain assessment tools before utilizing them

**Keywords:** pain assessment, educational program, nursing performance.

### Introduction

Pain perception in children is complex, and is often difficult to assess. In addition, pain management in children is not always optimized in various healthcare settings<sup>(1)</sup>. Uncontrolled pain has also direct impact on health outcomes and affects all areas of life. The emotional, cognitive, and behavioral components of pediatric patients are also important to assess pain and to simplify the management practices<sup>(2)</sup>. Pain may result in behavioral and physiological changes such as an alteration in vital signs and a change in facial expression<sup>(3)</sup>.

Studies have showed that unrelieved pain can affect the quality of life of the children, causing physical and emotional effects, impact on family, as well as increasing the cost for health care of the children and society<sup>(4)</sup>. Pediatric patients are the least treated and presented to hospital for pain compared to adults; because of the wrong belief

that they neither suffer pain nor they remember painful experiences<sup>(5)</sup>. If pain will be poorly managed, the quality of life experienced by the patient can be greatly reduced, regardless of their basic diagnosis<sup>(6)</sup>.

Pain is an individual, multifactorial experience influenced by culture, previous pain events, beliefs, moods, and ability to cope. It may be an indicator of tissue damage but may also be present in the absence of an identifiable cause. The degree of disability in relation to the experience of pain varies; similarly, there are individual variations in response to methods of pain relief. It is of particular importance to nursing care that unrelieved pain reduces patient mobility, resulting in complications such as deep vein thrombosis, pulmonary embolus, and pneumonia. Postsurgical complications related to inadequate pain management negatively affects the child's welfare and the hospital

performance because of extended lengths of stay and readmissions, both of which increase the cost of care <sup>(7)</sup>.

The pediatric populations are at risk of inadequate pain management, with age-related factors affecting pain management in children. Misconceptions exist which may contribute to pediatric patients receiving inadequate analgesia for procedures that would routinely be treated aggressively in adults. Although, much is known about pain management in children, and improvements are still needed to improve pediatric pain management in routine clinical practice <sup>(6)</sup>.

In pediatric age, it is more difficult to assess and treat pain effectively relatively to adults. The lack of ability to notice pain, immaturity of remembering painful experiences and other reasons are the reflection of persistence of myths related to the infant's ability to perceive pain <sup>(8)</sup>. Pain assessment tools attempt to quantify pain intensity. They provide a uniform standard assessment of pain and when used consistently they can improve communication, with the score obtained incorporated into a chart in the majority of acute care setting <sup>(9)</sup>.

Self-report is the standard method for pain assessment in acute care, using simply worded tools and questions that are designed to assess pain intensity <sup>(10)</sup>. There are many pain assessment tools available that can be used to identify the intensity and behaviors associated with pain. The tools include Visual Analogue Scale (VAS), Numerical Rating Scale (NRS), the Wong Baker face pain scale (WBFPS). The scores or ratings obtained should be used alongside a thorough clinical assessment of the individual patient <sup>(11)</sup>.

Treatment of pain in childhood includes pharmacological and non-pharmacological interventions. Pharmacological interventions include opioids, non-opioids analgesics, non-steroidal anti-inflammatory drugs, and adjuvant therapy <sup>(12)</sup>. Non-pharmacologic methods including physical and cognitive-behavioral measures are used to relieve

children's pain such as: comforting, hot and cold applications, massage, acupuncture, transcutaneous electrical nerve stimulation, relaxation, distraction, imagery, biofeedback, parental involvement and hypnosis <sup>(13)</sup>.

Nurses must be aware that a comprehensive pain assessment is influenced by factors including the person's illness or level of disability (i.e., pain is experienced in multiple areas), age, developmental stage, education level or cognitive status, ability to communicate, culture, ethnicity, biology, previous experiences with pain and reluctance to report pain <sup>(14,15,16,17)</sup>. Spirituality must also be considered, as it may influence a person's belief and behavior around pain. It is important for nurses to assess whether those factors would influence how a person reports pain and whether they would seek help for it. <sup>(15)</sup>

**Significance of the Study:** Hospitalized children are often inadequately treated for their pain. Unrelieved pain has a number of undesirable physical and psychological consequences. When these are considered, the need to manage children's pain effectively is clear. Moreover, there are many reasons for inadequate pain assessment and management in hospitalized children, insufficient knowledge of nurses about pain management in children. So that it is obvious that the nurse is in a very critical position to be sensitive to the child's pain and its management. In turn, this highlights the importance of pain assessment for appropriate pain management which is based on assessment data and the use of appropriate pain scale.

**The aim of the study was:**

To evaluate the effect of an educational training program on pediatric nurses' performance regarding pain assessment.

**Research Hypothesis:**

Nurses will have better knowledge and practice about pain assessment after

implementation of an educational program.

**Subjects and Method:**

**Research design:**

A quasi experimental design was used to carry out the present study.

**Study Setting:**

The present study was conducted at different pediatrics units including PICU, dialysis, general pediatric unit, cardiology, hematology and oncology unit at Zagazig University pediatric Hospital.

**Study Subjects:**

A convenient sample composed of all pediatric nurses (65) who give direct care to patients.

**Tools for data collection**

Two tools were used to collect the necessary data as follows;

**Tool I: A structured Interview questionnaire**

A structured interview sheet was developed by the researcher to collect the required data it consisted of three parts to collect the following data:

**Part I: Pediatric nurses' characteristics** such as age, educational level, years of nursing experience...etc.

**Part II: Pediatric Nurses' Knowledge regarding pain.** Pretest and posttest questionnaire to assess the pediatric nurses' knowledge about pain. Each right answer scored 1 mark and zero for wrong one.

**Part III: Pediatric Nurses' Knowledge regarding pain measurements.** Pretest and posttest questionnaire to assess the pediatric nurses' knowledge about pain assessment tools. Each right answer was scored 1 mark and zero was the score for wrong one.

**The total score of nurses' knowledge was (66) classified as follows:**

**Good** > 75%

**Fair** 50 – 75 %

**Bad** < 50 %

**Tool (II): Observational checklist:**

Pain assessment scales were used to evaluate pain. They were Wilson GAM Doyle<sup>(18)</sup>, children's hospital eastern Ontario pain scale McGrath et al<sup>(19)</sup>, Riley infant pain scale Schade et al<sup>(20)</sup>, FLACC scale Merkel et al<sup>(21)</sup>, and comfort scale for pain assessment Wielenga et al<sup>(22)</sup>.

**Validity and reliability:**

The structured interview sheet and observational checklist were reviewed by 5 experts (two professors of pediatric nursing, two professors of pediatrics medicine and one assistant professor of community health nursing).

**Reliability for the tools:**

Tools	Cronbach alpha	(test re-test)- r
Nurses' knowledge about pain	0.849	r = 0.721, P 0.0
Numeric pain scale	0.706	r = 0.733, P 0.0
visual analog scale	0.712	r = 0.801, P 0.0
Faces pain scale	0.727	r = 0.710, P 0.0
Ontario Pain scale	0.703	r = 0.732, P 0.0
Comfort Pain scale	0.651	r = 0.823, P 0.0
Riley Pain scale	0.673	r = 0.691, P 0.0
Modified Objective pain scale	0.699	r = 0.730, P 0.0
Flacc Pain scale	0.696	r = 0.673, P 0.0

**Field work:**

Data was collected during 6 months, starting in the period from the beginning of December 2016 to the end of May 2017. The researcher was available 5 days weekly (from Saturday to Wednesday) from 9 a.m. to 7:00 p.m. in the morning and afternoon shift. The educational program of this study was implemented in seven sessions were classified into two theoretical and five theoretical and practical. The first session was about pain, the second session about visual analog scale, numerical rating pain scale and faces pain scale. The Third session was about modified objective pain scale. The Fourth session was about children's hospital eastern Ontario pain scale. The Fifth session was about Riley infant pain scale, the sixth session was about Flacc pain scale and finally the seventh session was about comfort scale for pain assessment. Each session started with a summary of the previous

session and objective of the new one taking into consideration the use of the Arabic language and some English terms that suits the level of nurses' education. Motivation and reinforcement during a session were used in order to enhance nurses' learning. Nurses were divided into small groups. Each group included 10 nurses to facilitate the learning process. The length of each session differed according to the content and nurses' responses. It ranged from 35 – 45 minutes.

#### **Pilot study:**

A pilot study was conducted on 10% of the total sample (7 nurses) to evaluate the content of the tools, their clarity as well as to estimate the time needed for filling the sheets with the collected data. Nurses who shared in the pilot study were excluded.

#### **Administrative and ethical consideration:**

To carry out the study in the selected setting, a written approval was obtained from the director of Pediatric hospitals. The agreement for participation of subjects was taken after the explanation the aim of the study. They were given the opportunity to refuse to participate. They were notified that they could withdraw at any stage of the research Also; they were assured that information would be confidential and used for research purpose only.

#### **Statistical analysis:**

The collected data was coded and entered in a data base file using the FoxPro for windows program. After complete entry, data was transferred to the SPSS version 16.0 program. Data were presented as frequency and percentages (qualitative variables) and mean  $\pm$  SD (quantitative continuous variables). Chi square ( $\chi^2$ ) was used for comparison of categorical variables, and was replaced by Mont Carlo Exact test if the expected value of any cell was less than 5. Student's test was used for comparison of continuous quantitative variables (two groups) and one way Anova (F-test) was used for comparison of continuous quantitative variables (more than two groups). Correlation between two quantitative continuous variables was done by using Pearsons'

correlation. The difference was considered significant at  $P \leq 0.05$ .

#### **Results:**

**Table (1)** shows characteristics of studied subjects. It was revealed that 69.3% of nurses were in the age group 20 –to less than 30 years, with mean age of  $27.87 \pm 6.08$  years. Regarding years of experience, 58.5% of the studied nurses had 1- to less than 10 years of experience, with mean years of experience  $7.4 \pm 6.55$ . It was found also that 38.5% of studied nurses had either bachelor degree or technical institute of nursing diploma meanwhile, 23.0% of nurses had secondary school diploma degree in nursing. The same table also reported that all studied nurses (100%) never attended any previous training program about pain and pain assessment scales.

Impact of educational program on nurses' total knowledge score about pain was portrayed in **table (2)**. It was revealed that only 60% of the studied nurses had poor knowledge score before implementation of educational program. This percentage changed to 100% who had good knowledge after implementation of educational program, and decreased to 44.6% in the follow up phase. The difference was highly statistically significant ( $P=0.000^*$ ).

**Table (3)** portrayed the impact of educational program on nurses' total knowledge score about pain assessment. It was revealed that all of the studied nurses had poor knowledge score before implementation of educational program. This percentage increased to 100% nurses who had good knowledge after implementation of educational program, and 47.7% of nurses had fair knowledge in the follow up phase and the difference was highly statistically significant ( $P=0.000^*$ ).

Concerning to nurses' knowledge about pain and its measurements in **table (4)**. It was found that, there was a statistically significant difference between nurses' knowledge score about pain and its measurements before, after and at follow-up ( $t_1=97.535$ ,  $P=0.000$ ,

$t_2=48.535$ ,  $P=0.000$  and  $t_3=47.658$ ,  $P=0.000$ ) respectively

**Figure (1)** illustrated that none of the studied nurses used pain scales before the implementation of educational program, compared to all nurses who used all types of scales immediately after implementation of the pain program.

**Table (5)** reported distribution of nurses in different departments according to their utilization of pain assessment scales. It was found that all nurses in ICU unite used comfort scale, while 26.5% used Mops scale in general pediatrics unit, and in hematology and oncology. Meanwhile, 27.9% of nurses used Flacc scale. Also, 33.3% of nurses in renal dialysis unit used CHOPS scale, and 75% of nurses in cardio chest unit used Riley scale.

#### Discussion:

The International Association for the Study of Pain [IASP] <sup>(23)</sup>, defined pain as an "unpleasant sensory and emotional experience associated with actual or potential tissue damage or described it in terms of such damage". Pain is a universal experience. The American Pain Society <sup>(24)</sup> has labeled it "the fifth vital sign" to emphasize the importance of assessing pain frequently and providing appropriate treatment. The goal is to encourage health care professionals to assess pain every time that temperature, pulse, respiration, and blood pressure are assessed and to institute measures to manage the pain.

To provide optimal patient care, nurses require appropriate knowledge, skills and attitudes towards pain, pain assessment and its management. This must be based on the best available evidence to prevent patients from suffering harm NMC<sup>(25)</sup>. It is unacceptable for patients to experience unmanaged pain or for nurses to have inadequate knowledge about pain and a poor understanding of their professional accountability in this aspect of care Dimond<sup>(26)</sup>.

The present study showed that the studied nurses didn't receive any training course in their work regarding pain

assessment. This result was due to that there were no special hospital policies that regulate continuous training for nurses. So continuous training is required for all nurses working directly with children to improve their knowledge and performance. This finding was in agreement with Zhang et al<sup>(27)</sup> in a study titled "Effects of a Pain Education Program on Nurses' Pain Knowledge, Attitudes and Pain Assessment Practices in China" who reported that more than one half of the studied nurses had not received any pain education, either in school or in the clinical setting. Also, this went in line with Youssef et al<sup>(28)</sup>. In a published study about "nurses' knowledge about physiological and behavioral pain indicators of newborn in port –said", it was mentioned that minority of the nurses, attended training courses related to pain and its management.

Rieman & Gordon <sup>(29)</sup> stated that individual nurses vary in their ability to assess pain. Some of these differences have been linked to lack of or inaccurate clinical knowledge regarding pain. This supported the finding of the present study which revealed that three fifths of the studied nurses had poor total knowledge score about pain before implementation of educational program while all of them had good knowledge level after program. During the follow up phase (2 months later) some knowledge items decreased and others dropped a great deal depending on the difficulty of the information. Even though, their knowledge scores were still significantly higher than they were before the implementation of health instructions. This is may be due to lack of continued education and reinforcement during the follow up.

This finding was consistent with Mohammed <sup>(30)</sup>, who conducted a study to investigate knowledge and attitudes of pain management by nurses in Saudi Arabian emergency departments it was reported that there was lack of knowledge regarding pain assessment, pain management and lack of necessary training. Also, this finding agreed with Vickers <sup>(31)</sup>, who conducted a study to

evaluate knowledge and attitudes regarding pain among surgical nurses in three major teaching hospitals in Ireland", and there was a deficit in nurses' knowledge and attitudes regarding pain. The finding was in the same line with Al-Quliti & Alamri <sup>(32)</sup>. In the study about "Knowledge, attitudes, and practices of health care providers in Al-Madinah Al-Munawwarah, Saudi Arabia" Findings suggest that there is a significant knowledge deficit on pain and pain management. The study agreed with Youssef et al <sup>(29)</sup>, in published study about "nurses' knowledge about physiological and behavioral pain indicators of newborn in port –said" The majority of nurses had "poor" knowledge scores regarding newborns' pain.

The present study reported that all of studied nurses had poor total knowledge score about pain assessment before implementation of educational program. This improved and became good after program implementation and decreased in follow up phase.

This could be explained in the light of the present study that all nurses reported that they didn't have any training about pain assessment methods except the training they received during intervention phase of the current study. Also they didn't perform pain assessment in their daily practice. This finding was congruent with Lewithwaite et al <sup>(33)</sup>, who found in a study about "Nurses' knowledge and attitudes regarding pain management in hospitalized patient" that there was extensive knowledge deficits and poor attitudes of nurses working within numerous clinical settings. This finding was in line with Onwong'a <sup>(34)</sup>, in a study done about "nurses' knowledge and practices related to pain assessment for critically ill patients at a major public sector hospital in Johannesburg" who reported that there was lack of knowledge and confidence in using the pain assessment scale. Also, the study was consistent with Wang & Tsai <sup>(35)</sup>, who found in published study "Nurses' knowledge and barriers regarding pain management in Intensive Care Units". And On the same line with Rose et al <sup>(36)</sup>. in the study done about "Survey of

assessment and management of pain for critically ill patient" who reported that ICU nurses had lack knowledge in pain assessment and management.

The present study revealed that there was a statistically significant improvement of total mean score of nurses' knowledge regarding pain and pain assessment  $63.09 \pm 1.99$  after implementation of educational program than before educational program. This result might be due to the effect of educational program on the improvement of nurses' knowledge and due to nurses' enthusiasm for information acquisition. This finding was in consistence with Henry <sup>(37)</sup>, in a study about "knowledge and attitudes of nurses about pain management in patients with cancer" who mentioned improvement in knowledge scores following an educational intervention.

This study was in agreement with Zhang et al <sup>(27)</sup>, who reported in a study about "Effects of a Pain Education Program on Nurses' Pain Knowledge, Attitudes and Pain Assessment Practices in China" that nurses' knowledge improved after pain educational program. This study goes in accordance with Ellis et al <sup>(38)</sup>, in the study about "the implementation of a comprehensive program to improve the practices of pain management in a pediatric hospital" who found that nurses' knowledge improved after educational program. Also this study was in the same line with Bishop <sup>(39)</sup>, in study done about "nursing knowledge and attitudes regarding pain management of cancer patients" who illustrated that the nursing knowledge increased after an educational intervention.

Regarding to nurses practice about pain, there was a statistically significant improvement of nurses' practice throughout program phases. The findings suggest that nurses were interested in learning more about pain assessment scales. The present study reported that none of the studied nurses practiced any scale before program, while all nurses applied them immediately

after the program, while at the follow up phase, more than two thirds of nurses applied FLACC scale. This result may be due to the effect of the educational program, and scales were selected according to the child's age and developmental level. This was in a harmony with Kanyali <sup>(40)</sup>, who mentioned that no specific pain assessment tool or method is perfect for validating pain in children; each has its strengths and limitations. This study goes in line with Onwong'a <sup>(34)</sup>, who reported that there were differences in the use of pain assessment tool. The current study supported Bai & Hsu <sup>(41)</sup> study which reported that the FLACC scale was the most behavioral tool to measure pain intensity and distress associated with pain, and approved to assess sedation level and post-operative pain in children. This study was in contrast with Onwong'a <sup>(36)</sup>, in a study about "nurses' knowledge and practices related to pain assessment for critically ill patients at a major public sector hospital in Johannesburg" who reported that nurses did not use pain assessment scale for patients unable to self-report; but they used the combined use of vital signs and behavioral change.

Hockenberry & Wilson <sup>(42)</sup> stated that the most commonly used behavioral pain measures are FLACC scales, The Children's Hospital of Eastern Ontario Pain Scale (CHEOPS), and COMFORT ("behavior") scale used in critical care setting. This finding was consistent with the present study which revealed that the most common scales applied in different pediatric units at follow up were FLACC scale (more than two thirds), MOPS scale (more than one half), one third applied COMFORT scale, and more than two fifth applied CHOPS scale. This result may be due to the difference in child's age and cognitive level and might be due to similarity in items of all types of pain assessment scales. This study goes in line with Kahsay <sup>(5)</sup>, who reported that there was different studies concluded that FLACC scale was the most appropriate measurement tool for pain assessment in infants. This result was also supported by Mande et al <sup>(43)</sup>, who mentioned in their

study about "Educational video to improve the knowledge of health care providers in pain assessment of preschool children" who mentioned that FLACC was the most used in terms of sensible qualities by clinicians at their respective institutions. The current study was in agreement with Cohen et al <sup>(44)</sup>, who reported that the CHEOPS, COMFORT, and PIPP were applicable for real-time coding in clinical settings, and may help guide the application of pharmacological or other interventions. As observed from the current study, the most common applied scale in ICU was COMFORT scale. The finding was consistent with Kahsay <sup>(5)</sup>, who found that several other pain scales have been designed for the objective assessment of neonatal pain, including the COMFORT ("behavior") score, pain assessment tool, scale for use in newborns, distress scale for ventilated newborns and infants. The present study revealed that the most applied scale in oncology unit was FLACC scale. This finding was in agreement with Mohamed et al <sup>(45)</sup> in the published study "Pain Experience Profile in Children with Cancer: Prospective Analysis of 2216 Treatment Days in a Developing Country" who used the behavioral FLACC scale for assessment of pain intensity scores in patients with cancer. On the other hand, the study was in contrast with Wang et al <sup>(46)</sup>, who stated that the Brief Pain Inventory (BPI) was originally designed to assess cancer-related pain, and was currently the most commonly used cancer pain assessment instrument.

The current study illustrated that more than one third of studied nurses practiced CHEOPS scale in dialysis unit. This might be because it was appropriate for child's age. This finding was not in harmony with Kafkia et al <sup>(47)</sup> in a study about "Assessment and management of pain in hemodialysis patients: A pilot study" who reported that VAS, WBPS and McGill Pain Questionnaire were designed to assess pain in dialysis patients.

The present study revealed that there was a statistically significant

difference between nurses' characteristics namely age, qualification and years of experience and training course with their knowledge score. This finding was mainly due to that the majority of nurses had high educational level and positive response to educational program, may be that younger, or less experienced nurses perceived a greater need to know, and were more likely to apply this new knowledge to practice. This finding was in line with Mohammed<sup>(30)</sup>, who reported that there was a statistically significant difference between nurses' characteristics namely years of experience, and training courses with their level of knowledge. On the other hand, in disagreement with Land<sup>(48)</sup>, who found in the study about "nurses' knowledge on pain management practices and organizational pain management policy. In Ball state University; Muncie, Indiana' that educational level did not make a

#### **Conclusion:**

In the light of the current study findings, it might be concluded that the educational health program improved significantly pediatric nurses' knowledge and performance regarding pain assessment.

#### **Recommendations:**

- Pain assessment scales should be included in child's record.
- Educational program about pain assessment should be mandatory for all nurses and they should be provided on a continuing basis to update their knowledge and improve their practice.
- Standardized pain assessment scales should be available at hospitals for all nurses in order to follow it.
- The behavioral pain assessment tools must be well adopted into practice and nurses should have adequate training about it.

difference in pain knowledge scores and the experience levels of the nurses did not reach statistical significance. This finding was in contrast with Ortiz<sup>(7)</sup>, who reported in the study about "nurses' and nursing students' knowledge and attitudes regarding pediatric pain" that there was no statistically significant difference between nurses' characteristics as years of experience with their knowledge score. The present study was in the same line with Al-Quliti & Alamri<sup>(32)</sup>. in the study "Knowledge, attitudes, and practices of health care providers in Al-Madinah AlMunawwarah, Saudi Arabia " who reported that there was a statistically significant difference between nurses' level of education and their knowledge score. Also, in consistent with Youssef et al<sup>(28)</sup> who mentioned that there was a statistically significant relation between nurses' level of education and years of experience with their knowledge score.

**Table (1):** Characteristics of the studied nurses (Total n= 65)

Characters	Items	No	%
Sex	Males	2	3.1
	Females	63	96.9
Age\ years	20-30-40	45	69.3
		20	30.7
	Range	20.0 – 44.0 y	Mean ± SD
			27.87 ± 6.08 years
Social status	Single	11	16.9
	Married	53	81.5
	Divorced	1	1.5
Qualification	Diplome	15	23.0
	Institute	25	38.5
	Bachaloree	25	38.5
Experience/ years	< 1 year	6	9.2
	1-	38	58.5
	10-15	21	32.3
	Range	0.3 – 27.0 y	Mean ± SD
Department	ICU	20	30.8
	Pediatrics unite	9	13.8
	Renal dialysis	12	18.5
	Hematology	13	20.0
	Heart & chest unite	11	16.9
Training Program	▪ Yes	0.00	0.00
	▪ No	65	100

**Table (2):** Total Nurse's knowledge score about pain

Level of knowledge	Before		After		Follow up		Significance test
	No	%	No	%	No	%	
Poor knowledge	39	60.0	0	00.0	1	1.5	$\chi^2=49.29$ , P30.000*
Fair Knowledge	26	40.0	0	00.0	35	53.8	
Good Knowledge	0	00.0	65	100.0	29	44.6	
	Significance test		$\chi^2=130.00$ ,P10.000*		$\chi^2=66.43$ ,P20.000*		

(P1= comparison of Before Vs. After, P2= Comparison before vs. Follow up, P3= Comparison of after Vs. Follow up)

\*Significant at  $p < 0.05$

**Table (3):** Total Nurse's knowledge score about pain assessment scales.

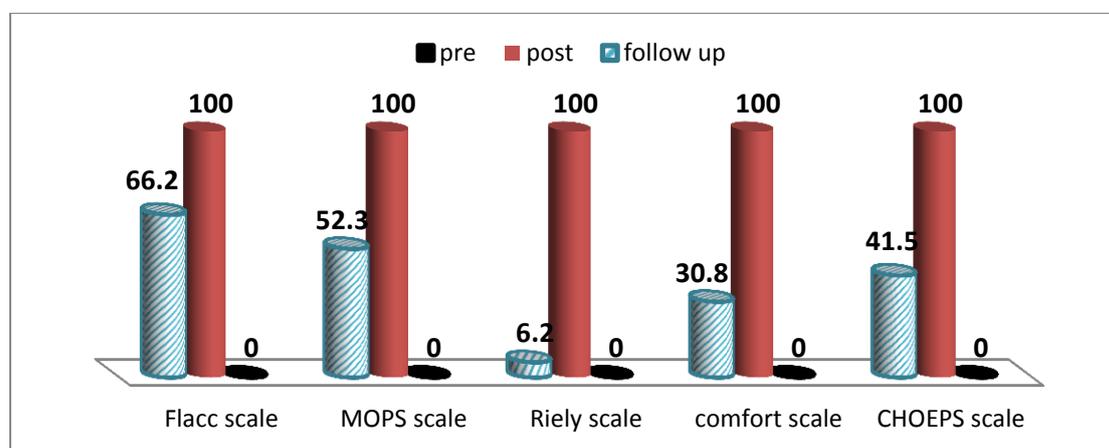
Level of knowledge	Before		After		Follow up		Significance test
	No	%	No	%	No	%	
Poor knowledge	65	100.0	0	00.0	34	52.3	$\chi^2=130.00$ , P30.000*
Fair Knowledge	0	00.0	0	00.0	31	47.7	
Good Knowledge	0	00.0	65	100.0	0	00.0	

Significance test  $\chi^2=126.03$ , P10.000\*q2  
 (P1= comparison of Before Vs. After, P2= Comparison before vs. Follow up, P3= Comparison of after Vs. Follow up). \*Significant at p < 0.0

**Table (4):** The average scores of nurses' knowledge about pain and its measurements throughout program phases

Items	Before Mean ± SD	After Mean ± SD	Follow up Mean ± SD	Significance test
Total knowledge score about pain and its measurements	8.92±4.56	63.09 ± 1.99	36.91 ± 4.50	t3=47.658, P0.000*
Significance test		t1=97.535, P0.000*	t2=48.535, P0.000*	

\*Significant at p < 0.05



**Figure (1):** nurses practicing different pain scales throughout program phases

**Table (5):** Distribution of nurses in different departments according to their utilization of pain assessment scales

Departments	No	Pain scales										P value test
		CHOEPS		Comfort		Riley		MOPS		Flacc		
		No	%	No	%	No	%	No	%	No	%	
ICU	20	6	22.2	20	100.0	0	0.0	4	11.8	0	0.00	$\chi^2=50.45, P0.000^*$
Pediatrics unite	9	1	3.7	0	0.00	0	0.00	9	26.5	8	18.6	$\chi^2=18.86, P0.001^*$
Renal dialysis	12	9	33.3	0	0.00	1	25.0	6	17.6	12	27.9	$\chi^2=28.40, P0.000^*$
Hematology Unit	13	1	3.1	0	0.00	0	0.00	4	11.8	12	27.9	$\chi^2=37.70, P0.000^*$
Heart & chest unit	11	10	37.0	0	0.00	3	75.0	11	32.4	11	25.6	$\chi^2=41.59, P0.000^*$
<b>Total</b>	<b>65</b>	<b>27</b>	<b>100.0</b>	<b>20</b>	<b>100.0</b>	<b>4</b>	<b>100.0</b>	<b>34</b>	<b>100.0</b>	<b>43</b>	<b>100.0</b>	

\* P&lt;0.05 (significant)

**References:**

1. Srouji R, Ratnapalan S, and Schneeweiss S. Pain in Children: Assessment and Non-pharmacological Management; Division of Pediatric Emergency Medicine, Department of Pediatrics, The Hospital for Sick Children, University of Toronto International Journal of Pediatrics;2010; (4):1-11.
2. American Pain Society. Assessment and management of children with chronic pain. (2012); Available at <http://www.am painsoc.org/advocacy/pediatric.htm>.
3. Byers J F and Thornley K. Cueing to infant pain; MCN: The American Journal of Maternal/Child Nursing. (2004); 29(2): 84- 89.
4. Taso JC, Meldrum M, Kim SC, and Zelter LK. Anxiety sensitivity and health-related quality of life in children with chronic pain. The Journal of Pain. 2007; 8(10): 814-23.
5. Kaysay H. Assessment and treatment of pain in pediatric patients. Department of Pharmacy, Collage of Health Science, Adigrat University, Adigrat, Ethiopia. Curr pediatric Res. 2017; 21(1):148-157.
6. Walters MA. Pediatric pain letter, pain assessment in Sub-Saharan Africa. International Association for the Study of Pain. 2009; 3(3): 138- 146.
7. Ortiz ML, Monter HA, Flores ER, Gamez BC, Quezada LC, O'Brien JP, Hernández GR, and Escamilla-Acosta MA. Nursing Research and Practice; Nurses' and Nursing Students' Knowledge and Attitudes regarding Pediatric Pain; Volume 2015 ;( 2015), Article ID 210860, 8 pages. <http://dx.doi.org/10.1155/2015/210860>.
8. Chiaretti A, Pierri F, and Valentini P. Current practice and recent advances in pediatric pain management. Eur RevMed Pharmacol Sci. 2013; 17: 112-126.
9. Porth CM, Gaspard K, and Anoble K. Essential of pathophysiology; concepts of altered health states. Chapter 35; 3<sup>rd</sup> ed. Walters Kluwer Health\ Lippincott. Williams &Wilkins. 2011; PP: 878.
10. Kumar A and Allcock N. Pain in Older People. Reflections and Experiences from an Older Person's Perspective. London: Help the Aged. British pain society. 2008; pp. 4-35.
11. Ruder S. Seven tools to assist hospice and home care clinicians in pain management at end of life. Home Health care Nurse. 2010; 128(8):458-468.
12. Zhu LM, Stinson J, Palozzi L and et al. Improvements in pain outcomes in a Canadian pediatric teaching hospital following implementation of a multifaceted, knowledge translation initiative. Pain Res Manage.2012; 17: 173-179.

13. Adams ML and Arminio GJ. Non-pharmacologic pain management intervention. *Clinics in Pediatric Medicine and Surgery*.2008; 25 (3): 409-29.
14. Brown DN, McCormack BG, and McGarvey H. Factors influencing the control of post-operative pain in older people. *Reviews in Clinical Gerontology*.2005; 15: 149-156.
15. Curry- Narayan M. Culture's effects on pain assessment and management. *American Journal of Nursing*.2010; 110(4): 38 – 47.
16. Dewar A. Assessment and management of chronic pain in the older person living in the community. *Australian Journal of Advanced Nursing*.2006; 24(1): 33-38.
17. Shepherd E, Woodgate RL, and Sawatzky J. Pain in children with central nervous system cancer: A review of the literature. *Oncology Nursing Forum*.2010; 37(4): E318-E330.
18. Wilson GAM Doyle E. Validation of three paediatric pain scores for use by parents. *Anesthesia*; 1996; 51: 1005-1007.
19. McGrath PJ, Johnston G, Goodman J T and et al. "CHEOPS: a behavioral scale for rating postoperative pain in children," in *Proceeding of the 4th World Congress on Pain: Advances in Pain Research and Therapy*, H. L. Fields, R. Dubner, and F. Cervero, Eds., Raven Press, New York, NY, USA. 1985: vol. 9, PP: 395–401.
20. Schade JG, Yoyce BA, Gerkenmeyer J, and et al. Comparison of three preverbal scales for postoperative pain assessment in a diverse Pediatric sample. *Journal of Pain and Symptom Management*; 1996: 12(6):348-359.
21. Merkel SI, Voepel-Lewis T, Shayevitz JR, and Malviya S. The FLACC: A behavioral scale for scoring postoperative pain in young children. *Pediatr Nurs*; 2002: 23(3): 293-297.
22. Wielenga JM, De Vos R, De Leeuw R, and De Haan RJ. "COMFORT scale: a reliable and valid method to measure the amount of stress of ventilated preterm infants". *Neonatal Network*; 2005: 23(2): 39–44.
23. International Association for the Study of Pain | Pain Definitions. Retrieved 12 October 2014: Derived from Bonica JJ. The need of taxonomy. *Pain*. 1979; 6(3):247–8.
24. American Pain Society. Quality of Care Committee; Quality improvement guidelines for the treatment of acute pain and cancer pain. *Journal of the American Medical Association*. 1995; 274, 1874- 1880.
25. Nursing and Midwifery Council .The Code; Standards of Conduct, Performance and Ethics for Nurses and Midwives. London. 2008. NMC. Available at: <https://www.nmc.org.uk/.../standards-to-supportlearning-and-assess>.
26. Dimond, B. *Legal Aspects of Pain Management*. Salisbury: 2002; Quay Books.
27. Zhang CH, Hsu L, Zou BR, Li J F, Wang HY, and Huang J. Effects of Pain Education Program on Nurses' Pain Knowledge, Attitudes and Pain Assessment Practices in China; *Journal of Pain and Symptom Management*. 2008; 36 (6): 616 27.
28. Youssef MM, Mahfouz FF and El-Husseiny H S. Nurses' Knowledge about Physiological and Behavioral Pain Indicators of Newborn in Port-Said; The Departments of Pediatrics Nursing, Faculty of Nursing, Alexandria; *Med. J. Cairo Univ*. 2013; 81(1), December:1117-1124, [www.medicaljournalofcairouniversity.net](http://www.medicaljournalofcairouniversity.net)
29. Rieman M, and Gordon M. Pain management competency evidenced by a survey of pediatric nurses 'knowledge and attitudes. *Pediatric nursing*. 2007; 33(4): 307 311.
30. Mohammed N. 'Investigate knowledge and attitudes of pain management by nurses in Saudi Arabian emergency departments: a mixed methods investigation" Doctor of Philosophy; School of Nursing and Midwifery.

- University of Western Sydney, Australia; 2015; PP: 111-132.
31. Vickers N. Knowledge and attitudes regarding pain among surgical nurses in three major teaching hospitals in Ireland' Master of Science; School of Nursing; Dublin City University. 2011; PP: 73-94.
  32. Al-Quliti KW and Alamri MS. Knowledge, attitudes, and practices of health care providers in Al Madinah Al Munawwarah, Saudi Arabia; assessment of pain; Neurosciences. 2015; 20(2): 131–136.
  33. Lewithwaite BJ, Jabusch KM, Wheeler BJ, Schnell-Hoehn KN, Wills J, Estrella-Holder E, and Fedorwicz A. Nurses' knowledge and attitudes regarding pain management in hospitalized adults. *Journal of Continuing Education*.2011; 42(6): 251- 257. <http://dx.doi.org/10.3928/00220124-20110103-03>
  34. Onwong'a I. Nurses' knowledge and practices related to pain assessment for critically ill patients at a major public sector hospital in Johannesburg; Master of Science in Nursing. Faculty of Health Sciences, University of the Witwatersrand. 2014; 99-102:121-122.
  35. Wang H and Tsai Y. Nurses' knowledge and barriers regarding pain management in Intensive Care Units. *Journal of Clinical Nursing*. 2010; 19(21-22): 3188-3196.
  36. Rose L, Haslam L, Dale D, and et al. Survey of assessment and management of pain for critically ill adults. *Intensive and Critical Care Nursing*. 2011; 27(4): pp.121-128
  37. Henry MD. Knowledge and Attitudes of Nurses about Pain Management in Patients with Cancer; Masters of Science; Ball state university. Muncie, Indiana. 2010; PP: 17-19.
  38. Ellis JA, McCleary, L, Blouin R, Dube K, Rowley B, MacNeil M, and Cooke C. Implementing best practice pain management in a pediatric hospital. *JSPN*.2007; 12(4): 264-277.
  39. Bishop DL. Nursing knowledge and attitudes regarding pain management of cancer patients; school of nursing; Master of Science in Nursing; the Florida State University. 2005; PP: 45-78.
  40. Kanyali H. Post-operative pain management in pediatric patients; Degree Thesis; Bachelor of Nursing; Arcada Department of Health and Social Work. 2017; PP: 27-35.
  41. Bai J, and Hsu, L. Pain status and sedation level in Chinese children after cardiac surgery: an observational study, *Journal of Clinical Nursing*, 22, 1/2. 2013; pp. 137-147, CINAHL, EBSCOhost, viewed 24 March 2017.
  42. Hockenberry M and Wilson D. Wong's essential of pediatric nursing; Pain assessment and management in children, 9th Ed. chapter 7, Mosby, an imprint of Elsevier Inc.2013; PP: 146-150.
  43. Mande S, Suraseranivongse S, Teerachanant T, and et al. Educational video to improve the knowledge of health care providers in pain assessment of preschool children. *Siriraj Med J* .2012; 64: 22-26.
  44. CohenL, Lemanek K, Blount R, Dahlquist L, Lim C, PalermoT, McKenna K, and Weiss K. Evidence-based Assessment of Pediatric Pain; *journal of pediatric psychology*. 2008; 33(9): 939–955.
  45. Mohamed M, Morsy AM, and Riad KF: Pain Experience Profile in Children with Cancer: Prospective Analysis of 2216 Treatment Days in a Developing Country; Department of Pediatric Oncology, South Egypt Cancer Institute, Egypt. *Journal of Cancer Prevention & Current Research*.2016; 4 (6).
  46. Wang XS, Cleeland CS, Wittink HM, and Carr DB. Outcomes measurement in cancer pain, *Pain Management: Evidence, Outcomes, and Quality of Life. A Sourcebook*, London Elsevier. 2008; PP: 361- 76.
  47. Kafkia T, Vehviläinen-Julkunen K. and Sapountzi-Krepia D. Assessment and

management of pain in hemodialysis patients: A pilot study; Prog Health Sci. 2014; 4(1): pp. 53-60.

Organizational Pain Management Policy; Masters of Science in nursing; Ball state university, Muncie, Indiana. 2010; PP: 12-17.

- 48.** Land C. Nurses' Knowledge on Pain Management Practices and