ACTA SCIENTIAE

**ISSN:** 2178-7727
**DOI:** 10.17648/acta.scientiae.6369

# IMPROVING NURSING PERFORMANCE REGARDING CARE OF CHILDREN WITH NEUROBLASTOMA

**1 Amal Kamal El-Nahas; 2 Randa Mohamed Adly; 3 Zeinab Fathy El-Sayed**
M.Sc in Pediatric Nursing, Faculty of Nursing - Ain Shams University, Cairo, Egypt
2, **3** Professors of pediatric nursing, Faculty of Nursing - Ain Shams University, Cairo, Egypt

## Abstract

Background: Neuroblastoma is an embryonic malignancy of early childhood originating from neural crest cells and showing heterogeneous biological, morphological, genetic and clinical characteristics. Nurses play an important role in providing care for neuroblstoma children treated by chemotherapy, radiotherapy or surgery (pre, during and post) exposure to the different treatment. **Aim**: The present study aimed to evaluate nursing performance regarding care of children suffering from neuroblstoma. **Design**: A quasi experimental pre/post-test research design was utilized. **Setting**: The study was conducted at in-patient solid department in 57357 Children Cancer Hospital. **Sample**: A convenience sample of 60 oncology nurses. **Tools I**: Structured interviewing Questionnaire which consisted of two parts A. To assess nurses, characteristics, B. To assess nurses' knowledge regarding neuroblstoma; **II:** Observational checklists to assess the nurses' practices toward care of children suffering from neuroblstoma. **Results**: The current study revealed that the majority of nurses had satisfactory knowledge and competent practices post program and in follow up with ($p< 0.001$) and positive correlation was found between nurse' knowledge and practices post program intervention and in follow up with ($p< 0.001$). **Conclusion**: In the light of the study findings, it can be concluded that, the educational program intervention was effective in improving the nurses' knowledge and practices regarding care of children suffering from neuroblstoma, there was a positive correlation between total knowledge and practices. These study findings were supported the study hypotheses. **Recommendation**: Implementation of periodical on job-training programs for oncology nurses to update and refresh their knowledge and practices about care of children with neuroblstoma.

**Keywords:** Neuroblastoma; Oncology; Pediatric; Nurses; Surgery**ntroduction**

Neuroblastoma is the most common extra-cranial solid tumor in children and represents a neoplastic expansion of neural crest cells in the developing sympathetic nervous system. The primary tumor originates anywhere along the sympathetic chain but most frequently arises from the adrenal gland. Prognosis is largely dependent on tumor biology, and tumor characteristics that associate with aggressive tumor behavior and poor prognosis at over 18 months of age and more in boys, expected tumor biology can be predicted by tumor histology and molecular markers, both of which are strongly associated with children' age ***(Brodeur, 2018) .***

Children with neuroblstoma are risk stratified based on a combination of radiographic, histologic, cytogenetic, and age at the time of diagnosis. Overall survival for children with high-risk neuroblstoma was less than 15%. With the additions of radiation therapy, autologous stem cell transplant, immunotherapy, and the differentiating agent isotretinoin. Worldwide neuroblstoma accounted for 50% of pediatric tumor ***(Brady, 2020).***

Nurses play an essential role in caring for children with Neuroblstoma through preparing the children and their families for diagnostic measures and therapeutic methods, postoperative care nurses observe the wound incision for erythema, drainage or separation and they provide emotional support for children and their families to assist them in coping with the disease. Moreover, nurses caring for children receiving chemotherapy/ radiation require focus knowledge to safe child's life ***(Oberoi et al., 2018).***

Educational program intervention and follow up the program after appropriate time about care of children suffering from Neuroblstoma and its management will qualifies the nurses to assess the children in a continuous process through the treatment and follow up. Meanwhile, nurses are the most important person that care for child during chemotherapy and radiotherapy and detect its toxicity, so the educational program is very beneficial icon to avoid theses side effects of the treatment ***(Grundy, et al., 2017).***

**Importance of the study:**

Worldwide about 90% of neuroblstoma are diagnosed before 5 years 30% of those are within the 1st year. The median age of diagnosis is 22 months. Rarely does it present in adolescence. Neuroblstoma usually affect many organs. The early education should be delivered for imparting sufficient knowledge and skills for child and his parents ***(WHO, 2019)***
Moreover, nurses need to advanced knowledge and practices in caring with children with neuroblstoma, so the educational program for nurses in field of oncology can help them to deal with this disease, side effect of chemotherapy/ radiotherapy and how to prevent the complications of neuroblstoma and different types of treatment. So, this study was conducted to determine the intervention on nurses regarding care of children suffering from neuroblstoma

**Aim of the study**

Evaluate nursing performance regarding care of children suffering from neuroblstoma through:

1- Assessment for knowledge and practices of nurses pre/post and follow up regarding care of children suffering from neuroblstoma
2- Development, implementation and evaluation the effect of educational program intervention regarding care of children suffering from neuroblstoma

**Research hypothesis**: Nursing intervention will improve the nurses' performance which consequently improve nursing care given for children suffering from neuroblstoma.

**Subjects and Methods**

**Research design:** Quasi Experimental pre-/post-test research design was utilized.

**Setting**: The study was conducted in In-Patient Pediatric Solid Department affiliated to Children Cancer Hospital (57357) Egypt. It is the biggest oncology hospital in Egypt. This department found in new 3rd floor of hospital divided into two sections, each section consists of 15 rooms every room include two beds.

**Sample type**: Convenience sample of nurses was taken from 57357 Children Cancer Hospital with Inclusion criteria: included the nurses working at previous mention setting and willing to participate in the study.

**Sample size**: The total number was calculated based on the inclusion criteria equally (60 nurses) were participated in the study, the study subjects were divided randomly to small groups from 4-5 nurses.

**Tools for data collection:**

**Tool I: Structured interview questionnaire (pre/post & follow up):** It was designed by the researcher based on recent literature review and included the following parts:

**A. Characteristics of studied nurses:** consisted of age, gender, educational level, years of experience, training program attainment.

**B. Concerned with assessment of the studied nurses' knowledge (pre/post & follow up)** regarding Neuroblstoma in children included 39 questions (MCQ,opend&closed) such as, definition, causes & predisposing factors, risk factors, diagnosis, stages of the disease, complications, and treatment. Also, knowledge about signs of Neuroblstoma in children according to its site (abdomen, chest, bone & neck); chemotherapy (such as: goal, methods of administration, side effect and its treatment), radiotherapy (such as goal, methods of administration, indication, contraindication, side effect and care during radiotherapy); knowledge about pre/post-operative care; knowledge about stem cell transplantation (included: goal, reason for bone marrow transplant, types, examination required, follow up, types of treatment after transplantation, food ingredient post-transplant, and its complication). Additionally, knowledge about bleeding, prevention of infection and the emotional support; Scoring system: each correct answer was scored 2 grades, correct and incomplete answer scored 1 grade and the wrong answer was scored 0. The score was categorized into: satisfactory level if the percent score ≥ 60% and unsatisfactory level if less than < 60% .

**Tool II: Observational checklist to assess nurses' practices regarding care of children suffering from neuroblstoma (pre/ post & follow up):** It included hand washing (11 steps),hand hygiene(7), vital signs (35 steps), nurses' role during chemotherapy administration (22 steps), nurses' role in extravasation (16 steps), pre/post-surgical operative care (28 steps), nurses' role during blood transfusion (29 steps), wound dressing (18 steps), mouth care (15 steps).

Scoring system: each step done correctly was scored one grade and each step done incorrectly or not done was scored zero. The total score were summed up and converted into percent score and classified into competent practices ≥85% and incompetent practices <85%

**Content Validity and Reliability**

Content validity: It was ascertained by a panel five of the experts in pediatric nursing; to test the content validity by reviewing the tools clarity, relevance, comprehensives, and simplicity; their opinions elicited regarding the format, layout, consistency, accuracy, completeness and minor modifications were done.

Content reliability: The tool was tested to ensure that an assessment tool produces stable and consistent result overtimes reliability of the study tools used Alpha Cronbach's test for knowledge =0.867. Reliability for practices =0.913.

**Ethical consideration:** Ethical approval granted from the Scientific Research Ethical Committee from the Faculty of Nursing, Ain Shams University. While in 57357 children Cancer Hospital Egypt as a process to gain the approval to conduct the study, the researcher explained the aim and the nature of the study in Scientific Medical Advisory Committee (SMAC) to gain their acceptance & support. Additionally, the researcher obtained an approval from the Institutional Review Board (IRB) at the data collection setting. The nurses were assured that data collected was used only for research. Each nurse was informed that participation was voluntary had right to withdrawal at any time of data collection and there is no harm.

**Pilot Study:** A Pilot study was done to purposive sample of 6 nurses were selected for the study. To test the objectivity and applicability of the research tools and the feasibility of the research process; Participant nurses in the pilot study were included from the research study. The pilot study revealed the feasibility, effectiveness and appropriateness of the study instruments.

**Procedure:**
The fieldwork of the current study was carried out from the beginning of February (2022) till the end of July (2022) covered six months, at Children's Cancer Hospital Egypt, In- Patient Department. The researcher was available in study setting five days/week at the morning shift from 9 Am to 4 Pm; from Sunday to Thursday. The actual fieldwork started by assessing all nurses for their level of knowledge and practices for the educational program implementation, the actual field work was divided into four phases; assessment, planning, implementation and evaluation

**The Assessment Phase:** In this phase, the researcher review the literature using the available national and international related literature to be oriented with the research problem and to develop the study tools. Then the researcher began to explain questionnaire components and the research plan. After explanation, the researcher distributes the tools and began to fill pretest. Each nurse was assessed characteristic, level of knowledge and practices. The filling of pretest took from 20 to 30 minutes.

**Planning phase:**
The constructed educational program was planned according to the deficit needs of knowledge and practices of the studied nurses. The content of the education program was designed by the researcher using the theoretical relevant literature and classified into sessions to cover the content. Illustrated booklet was designed by the researcher in an Arabic language to serve knowledge and practices for nurses. The total number of sessions was ten, 5 sessions for theoretical content and 5 sessions for the practices content, each session took one hour.

Theoretical sessions (5 sessions) covered the following items: Overview about neuroblstoma such as; definition, causes, predisposing &risk factors, diagnosis, stages of the disease, complications, sings related each site, methods of treatment as chemotherapy, radiotherapy, pre/post-operative care, stem cell transplantation, immunotherapy, bleeding, infection, and emotional support.
Practical sessions was included (5 sessions) covered the following items: actual care giver' practices regarding care of their children namely; hand washing, hand hygiene, vital signs, administration of chemotherapy, extravasation, pre/post-operation, blood administration, wound

dressing and mouth care. Based on the deficit needs of the studied nurses, the booklet was developed, designed and distributed after implementation of the pretest.

**The Implementation Phase:**
The researcher was available in the study setting five days weekly to implement the study. Studied nurses divided into small group included 4-5 nurses,

The educational program consumed six months for its implementation. The researcher distributes to the studied nurses an Arabic handout about care for children with neuroblstoma. A teaching classroom was selected in the study setting, while different teaching methods were used such as; lecture, modified small group discussion, demonstration and re demonstration. Suitable media was used such as power point, presentation, lab top, real objects during the nurses' practical skills. The researcher told the nurses that posttest will be conducted after accomplishment educational program sessions.
**Evaluation phase:** Upon the completion of the educational program. The post test was done for nurses to evaluate the outcomes of the program using the same study tools. Follow up was performing after three months followed posttest.

**Administrative design:**
Written approval letter was taken from the responsible authorities Dean Faculty of Nursing Dean at Ain Shams University to the director of the 57357 directors) after explaining the purpose of the current study and programmed schedule for completion of the study procedures. All data about objectives, importance of the study and procedures of the current study were explained.

**Statistical analysis:**
Data were entry to statistical package for social science (SPSS version 26) was used for statistical analysis. The collected data in pre-test and post-test were categorized, organized, tabulated in tables using numbers and percentage, mean percentage and standard deviation. Chi-square ($x^2$) test used to test the relation among studied qualitative variables, Person correlation coefficient (r) was used for correlation analysis, compare quantitative variables in the same group and correlation coefficient test was used to rank different variables against each other either positively or inversely. Statistical insignificance was considered at $P > 0.05$ and significance at $P < 0.05$.

**Results**

**Table (1):** Reveals that, 53.3% of the studied nurses, their age ranged from 20: -<30years, with Mean SD score of 24.32 ± 1.50 year, 63.3% of them were female. In relation to the educational level of the studied nurses, it was found that, 85% of them were bachelor of nursing. Moreover, 38.4% of the studied nurses were from 3 to 6 years of experience in care of children with neuroblstoma with Mean 3.72 ± 5.38.

**Figure (1):** Illustrated that, 81.7% of the studied nurses were not attended training programs about to caring the children suffering from Neuroblastoma.

**Table (2):** Illustrates that, 71.7% of studied nurses had unsatisfactory level of knowledge pre-program implementation, 93.3% & 75% of studied nurses had satisfactory knowledge post program and follow up respectively. So, there was a statistically significant difference between pre, post and follow up (P<0.001).

**Figure (2):** Highlights a marked improvement in total nurses' knowledge regarding care the children post program and follow up, with highly statistically significant difference at p<.0001

**Table (3):** illustrated that, 78.3% of studied nurses had incompetent practice at pre-program implementation, while 93.3% & 83.3% of studied nurses had competent level of practice at post program and follow up respectively. So, there was a statistically significant difference between pre, post and follow up (P<0.001).

**Figure (3):** Illustrates that, the great majority of studied nurses were improved the practices post program implementation with highly statistical significant difference between pre-test and post program (p <0.001).

**Table (4):** Illustrates that there is positive correlation with highly statistically significant difference between nurses' total knowledge and total practices before the program implementation at p ≤0.01.

**Table (5):** Illustrates that there is positive correlation with highly statistically significant difference between nurse's total knowledge and total practices post the program implementation at p ≤0.001.

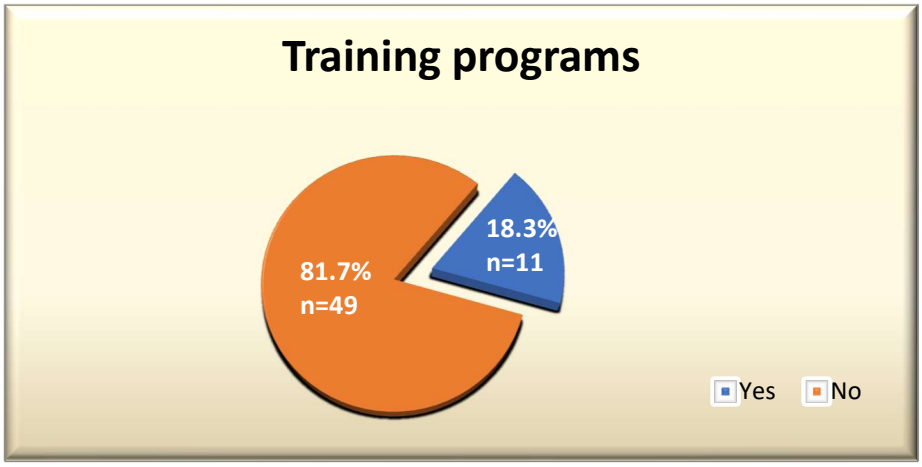
**Table (6):** Illustrates that there is positive correlation with highly statistically significant difference between nurse's total knowledge and total practices at follow up the program implementation at p ≤0.001.

**Table (1): Distribution of studied nurses according to their characteristics (N=60)**

| Nurses' characteristics | No. | % |
|---|---|---|
| **Age/years** | | |
| 20 :< 30 | 32 | 53.3 |
| 30 :< 40 | 19 | 31.7 |
| > 40 | 9 | 15.0 |
| **Mean ±SD** 24.32±1.50 | | |
| **Gender** | | |
| Male | 22 | 36.7 |
| Female | 38 | 63.3 |
| **Educational level** | | |
| Diploma in Nursing | 6 | 10.0 |
| Technical Health Institute | 3 | 5.0 |
| Bachelor of Nursing | 51 | 85.0 |
| **Years of experience in care of children with neuroblstoma** | | |
| 1 -< 3 | 10 | 16.7 |
| 3 -< 6 | 23 | 38.4 |
| 6 -< 9 | 20 | 33.3 |

| | | |
|---|---|---|
| 9 -< 12 | 5 | 8.3 |
| > -12 | 2 | 3.3 |
| **Mean ±SD** 3.72± 5.38 | | |

**Figure (1): Distribution of the studied nurses according to their attendance the training programs (n=60)**



| Total level of nurses' knowledge related to Neuroblastoma in children | Pre | | Post | | Follow up | | $\chi^2$ (1) P-value | $\chi^2$ (2) P-value |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | | |
| Satisfactory ≥ 60% | 17 | 28.3 | 56 | 93.3 | 45 | 75.0 | 53.197 0.001** | 26.162 0.001** |
| Unsatisfactory < 60-75% | 43 | 71.7 | 4 | 6.7 | 15 | 25.0 | | |

**Table (2): Total level of nurses' knowledge regarding care of children suffering from Neuroblastoma (pre, post & follow up) (N=60)**

χ1 between pre and post χ2 between pre and follow up. Chi square test for Friedman test ** highly statistically significant difference at (P<0.001)

**Figure (2): Total level of nurses' knowledge regarding care the children suffering from Neuroblastoma (pre, post & follow up) (N=60).**

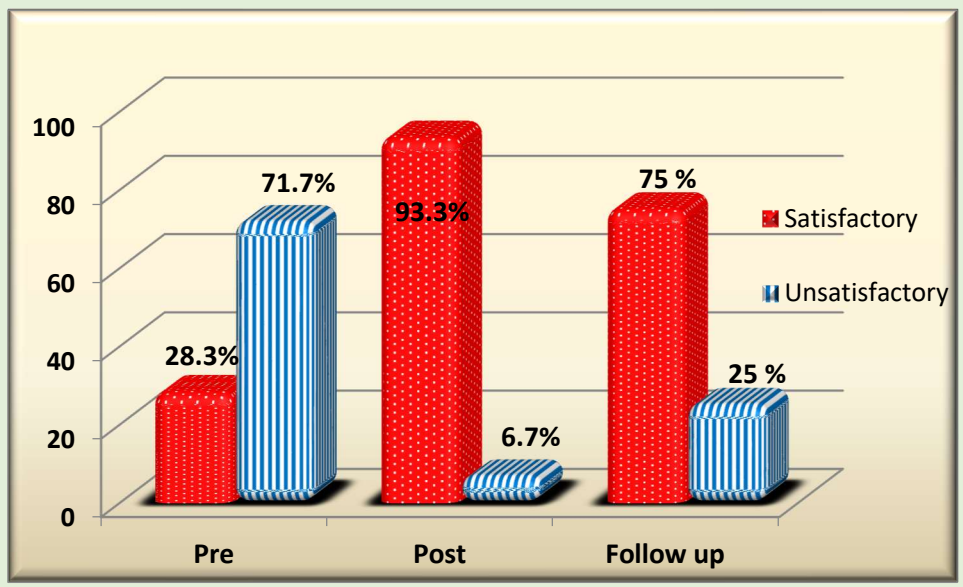



**Table (3): Total level of nurses' practices regarding care of children suffering from Neuroblastoma (pre, post & follow up) (n=60)**

χ1 between pre and post χ2 between pre and follow up. Chi square test for Friedman test ** highly statistically significant difference at (P<0.001)

| Total level of nurses' practices related to Neuroblastoma in children | Pre | | Post | | Follow up | | $\chi^2_{(1)}$ P-value | $\chi^2_{(2)}$ P-value |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | | |
| Competent | 13 | 21.7 | 56 | 93.3 | 50 | 83.3 | 62.141 0.001** | 31.52 0.001** |
| Incompetent | 47 | 78.3 | 4 | 6.7 | 10 | 16.7 | | |

**Figure (3):-Total level of nurses' practices regarding care of children suffering from Neuroblastoma (pre, post & follow up).**

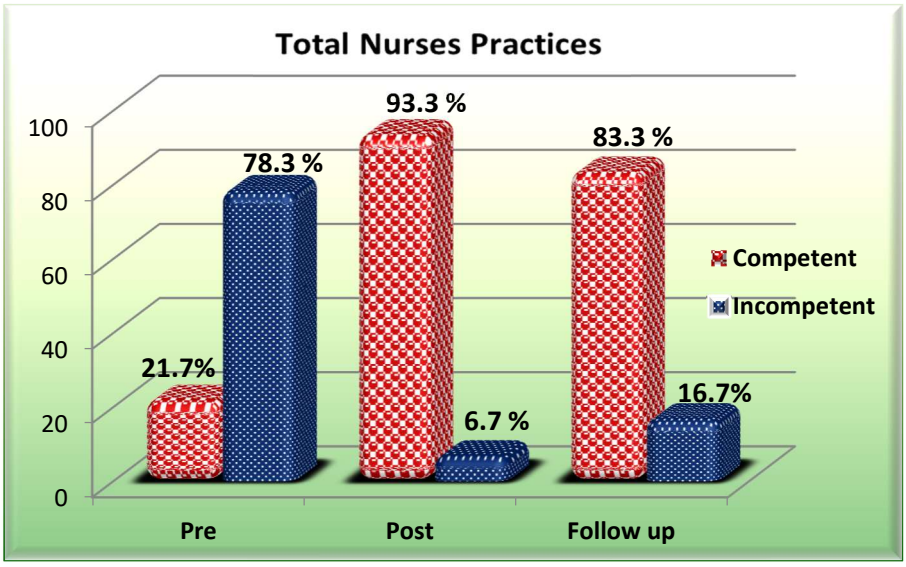



**Table (4): Correlation between nurses' knowledge and practices regarding care of children suffering from Neuroblastoma in pre-program (n=60).**

| Items | | Total level of knowledge |
|---|---|---|
| Total level of practices | r | .456 |
| | P-value | 0.000** |

**r: Pearson coefficient *Statistically significant at p ≤ 0.001**

**Table (5): Correlation between nurses' knowledge and practices regarding care of children suffering from Neuroblastoma in post program (n=60).**

| Items | | Total level of knowledge |
|---|---|---|
| **Total level of practices** | r | .876 |
| | P-value | 0.000** |

**r: Pearson coefficient *Statistically significant at p ≤ 0.001**

**Table (6): Correlation between nurses' knowledge and practices regarding care of children suffering from Neuroblastoma in follow up program (n=60).**

| Items | | Total level of knowledge |
|---|---|---|
| **Total level of practices** | r | .645 |
| | P-value | 0.000** |

## Discussion

Neuroblastoma is an embryonic malignancy of early childhood it is the most common extra-cranial solid tumor in infants and children, approximately representing 8%-10% of all children tumors, and nearly 500 new cases are reported annually. Children with neuroblstoma are risk stratified based on a combination of radiographic, histologic, cytogenetic, and age at the time of diagnosis, overall survival for pediatric population with high risk neuroblstoma was account 15% of all cancer deaths. In addition the radiation therapy, autologous stem cell transplant, immunotherapy ***Brodeur et al., (2019).***

Nurses' role regarding children suffering from neuroblstoma is very important to assess child's history, physically, nutrition, and child' pain, family anxiety and. The expected outcomes for these children should include relieving the pain, anxiety, accepted weight child and oral care. Also, parents and their children should express feeling about the illness **(Khan & Seed, 2018).**

Regarding the characteristics of studied nurses, the current study showed that the mean of nurses' age was 24.32±1.50, The current study finding in the same line with ***Ahmed et al.,*** **(2018)** who conducted a study about the impact of educational program on nursing care for children suffering from wilms' tumor, who mentioned that less than half of the study sample their age ranged between 20-30 years in the recovery room and surgical area with mean, was 26.05±2.16.

According to the educational level of the studied nurses, the results of the current study clarified that the majority of the studied nurses had bachelor degree in nursing. This may be due to the fact faculty of nursing provides the Egyptian society with large number of graduate nurses with bachelor degree. This finding agreed with the result of the study done by ***Syan et al., (2017)*** in a study entitled "Efficacy of distraction on pain relief during lumbar puncture in children with leukemia at South Egypt Cancer Institute" who found that, the majority of the nurses were qualified as bachelor degree.

Concerning years of experience and attending the training program of the studied nurses, the current study indicated that, more than one third of nurses had 3 to less than 6 years of experience with mean 3.72±5.38 years in caring for children suffering from neuroblstoma. Also, the majority of them didn't attending program related to caring the children suffering from neuroblstoma. This result was in contrast with ***Radhika & Ravikiran, (2019)*** who conducted a study entitled "Nurses' knowledge and education about oral care of cancer patients undergoing chemotherapy and radiation therapy" and found that the majority of the studied nurses had 5 years of experience. Furthermore, more than two thirds of them were females and did not attend previous training program related to caring the children suffering from neuroblstoma.

Concerning the nurses' knowledge in relation neuroblstoma in children; This result the same line with ***Toba et al, (2019),*** who considered a study entitled "Nurses' intervention among knowledge, barriers, and practices regarding neuroblstoma management " and reported that; more than two thirds of the studied nurses participant had satisfactory knowledge regarding neuroblstoma post implementation compared to pre-program intervention.
According to the total level of knowledge about caring the children with neuroblstoma, the study results reported that, nearly to three quarter of the studied nurses had unsatisfactory level of knowledge regarding Neuroblastoma pre-program compared to the majority and three quarter of them respectively had satisfactory level of knowledge post program implementation and at follow up, with a highly statistical significant difference. This result was agreed with ***Soliman et al., (2021,)*** who mentioned that the majority of studied participant had satisfactory total score level of knowledge about care of neuroblstoma. Moreover, this finding was supported by the study of ***Khan et al., (2018),*** who conducted a study to assess knowledge, skills of oncology nurses, and found that the nurses have poor knowledge and skills.

From the researcher's point of view, the majority of the studied nurses had good knowledge post educational implementation due to the program content which was tailored based on nurses' needs regarding care of children with neuroblstoma and the educational program was effective in improving nurses' knowledge.

The current study revealed that, there was statistically significant difference between nurses' levels of practices regarding care of children suffering from neuroblstoma in each items such as hand washing, vital signs, chemotherapy administration, pre/post operation care and mouth care the study finding was supported by the study of ***Kruzik, (2018),*** who study benefits of preoperative education for elective surgery patients in USA, and mentioned that increase the level of practices is associated with the increased level of satisfaction for nurses toward child care. The researcher believes that the implementation of educational program increase level of knowledge and practices, which indicated the nurses to provide a high quality of care, meanwhile these factors reflected self-esteem and trust leading to increase degree of satisfaction and empower the nurses to caring the children and support their families.

In relation to total level of the studied nurses' practices regarding care of children suffering from Neuroblastoma, the current study reflected that, more than three quarter of the studied nurses had incompetent level of practice regarding care of children suffering from Neuroblastoma pre-program implementation compared to the majority of them post program and at follow up with highly statistical significant difference. This result might be due to unavailability of educational program related to care for children suffering from Neuroblastoma. This result was in agreement with ***Gamal, et al., (2022)*** who conducted a study entitled "Developing nurses' performance

guidelines for patients with rectal cancer undergoing radiotherapy" while it was found that, slightly about two thirds of the studied nurses had unsatisfactory level of practices regarding neuroblstoma undergoing radiotherapy. This result was in accordance with ***Tsuchihashi et al., (2018)*** aimed in a study to survey the difficult experiences of nurses caring for children undergoing radiation therapy found that majority of the studied nurses was average practices before the educational program and good total score of all nurses after training program.

As regards the correlation between total level of knowledge and practices the current study illustrated that, there were a positive correlation between total level of nurses' knowledge and practices at pre & post program implementation and follow up ($P \leq 0.001$). These results were in the same line with ***Frisch et al., (2018),*** who conducted a study entitled nurse practitioner role in prepare familias for pediatric surgery mentioned that, there was a positive correlation between total nurses' knowledge and practice scores before & after intervention and at follow up the ($P \leq 0.001$) regarding nursing care for children suffering from Neuroblastoma.

The positive correlation highlights the importance of ongoing education and support for nurses. As new information becomes available and nurses needs to updated resources, guidance, and support networks to help them navigate the challenges associated with caring for a child with Neuroblastoma

## Conclusion

In the light of the study findings, it can be concluded that, the educational program was effective in improving the nurses' knowledge and practices regarding care of children suffering from neuroblstoma, there was a positive correlation between total knowledge and practices. These study findings were supported the study hypotheses.

## Recommendations

In the light of the study findings the following recommendations are suggested:

Continuous on job-training programs for oncology nurses to update and refresh their knowledge and practices about care of children with neuroblstoma.

Regular clinical sessions to improve the nursing performance at 57357 hospitals regarding to care of children with neuroblstoma

nurses who are working in oncology unit Orientation program, prior to care of children with neuroblstoma

Further studies and replication of this study in other pediatric oncology departments

**Acknowledgement:**

The author grateful thanks the nurses working in oncology units for their effective participation in the study and also the through all phases of the study. In addition, thanks for dean of the faculty and directors of 57357 hospitals for agreement to conduct this study.

## References

**Ahmed, E., Soliman, C., Saad, S. Younes, A., Mahmoud, F. (2018**): Impact of educational program on nursing care for children suffering from wilms' tumor, Egyptian Journal of Health Care,.9.(2) 161-175

**Brady, S., W., (2020):** Pan-neuroblastoma analysis reveals age-and signature-associated driver alterations. National . Community Journal. 11, 5183

**Brodeur, G., M., (2018):** Spontaneous regression of neuroblastoma. Cell Tissue Oncology Health Journal Res. 372, 277–286

**Brodeur, G., Hogarty, M., Bagatell, R., Mosse, Y., Maris, J., (2019):** Neuroblastoma: biology, prognosis and treatment; Principles and Practice of Pediatric Oncology, 7th ed.; Pizzo, P., Poplack, D., Eds.; Wolters Kluwer: Philadelphia, 772- 798

**Frisch, A., Johnson, A., Timmons, S., Weatherford, C., (2018):** Nurse practitioner role in preparing families for pediatric surgery. Taylors Free Medical Clinic, Taylor, 14 (6): 373-9.

**Gamal, L., Abdelatief, D., Mostafa, W., Hussein, Z., Baker, A., (2022):** Developing Nurses Performance Guidelines for Patients with Rectal Cancer Undergoing Radiotherapy; Egyptian Journal of Health Care, 13 (4) 587-599

**Grundy, P., Ritchey, M., Perlman, J., and Kalapurakal, A., (2017):** Renal Tumors of childhood. In: Kufe DW, Pollock RE, Weischselbaum RR, Bast RC, Gansler TS, Holland JF, Frei E, eds. Cancer Medicine. 6th ed. Pheladelphia

**Khan, K., Ali, K., Saeed, A., (2018):** Assessment of knowledge, skill and attitude of oncology nurses in chemotherapy administration in tertiary hospital Pakistan. Open Journal of Nursing, 48 (9) pp. 97-103.

**Kruzik, N., (2018):** Benefits of preoperative education for children elective surgery patients; Reserch Journal of Oncology 90 (3):381-7

**Oberoi, D. V., White, V., Jefford, M., Giles, G. G., Bolton, D., Davis, I., Harrison, S. (2018):** Caregivers' information needs and their 'experiences of care' during treatment are associated with elevated anxiety and depression: a cross-sectional study of the caregivers of renal cancer survivors. Supportive Care in Cancer, 8 (2) 1-10.

**Radhika S., & Ravikiran, E., (2019):** Nurses' knowledge and education about oral care of cancer patients undergoing chemotherapy and radiation therapy, 20 (4) 108-116 Availableat:http://www.ncbi.nlm.nih.gov/pubmed/?term=Pai%20RR%5BAuthor%5D&cauthor=true&cauthor_uid=26009678 22/6/2016 20:00

**Soliman, H. Zackaria, S., & Mohammed, H. (2021):** Cancer program attitude, knowledge and practice among children with neuroblstoma health care workers in Umm AL Quwain primary health care centers, International Research Journal of Public and Oncology Health, 8(1):48-56.

**Syan, A., Ali, A., & Gad Allah, M., (2017):** Efficacy of distraction on pain relief during lumbar puncture in children with leukemia at South Egypt Cancer Institute, Faculty of Medicine, Assiut University. A thesis submitted in partial fulfillment of the requirements for a master degree in pediatric nursing. Egypt, pp. 46 -49.

**Toba, H., Samer, A. & Zyoud, S., (2019):** Nurses' intervention among knowledge, barriers, and practices regarding neuroblstoma management: a cross-sectional study from Palestine. BMC Medical Education, 19(1):167.

**Tsuchihashi, Y., Matsunari, Y., & Kanamaru, Y., (2018):** Survey of Difficult Experiences of Nurses Caring for Children Undergoing Radiation Therapy: An Analysis of Factors in Difficult Cases. Pediatric Journal Oncology Nurs. 5(1): 91–98. doi: 10.4103/apjon.apjon_48_17

**World Health Organization (WHO) (2019):** Cancer
Priorities in developing countries, Annually Oncology, 12(8):112-120. Retrieved from www. Global health. org/ cancer priorities in developing countries annually oncology, 12(8): 1120120. Retrieved from ww. globalhealth.org/.