# Effect of Educational Program on Nurses' Performance regarding Care of Children with Tracheostomy

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## Abstract

**Background:** A tracheostomy is one of the most common procedures performed in pediatric intensive care unit for critically ill children requiring prolonged mechanical ventilation for acute respiratory failure and for airway issues. **Aim of study:** Was to evaluate effect of educational program on nurses' performance regarding care of children with tracheostomy. **Design:** A quasi-experimental design was used in the current study. **Settings:** The present study was conducted at Pediatric Intensive Care Unit in Benha University Hospital and Pediatric Intensive Care Unit & Neonatal Surgical Care Units in Benha Specialized Pediatric Hospital. **Subjects:** A convenient sample of (70) nurses who working at the previously mentioned settings were included in the study and a purposive sample of (48) child who had tracheostomy. **Tools of data collection:** Two tools were used. **Tool (1):** A structured interviewing questionnaire sheet to gather data in relation to characteristics of the studied subjects and nurses' knowledge regarding care of children with tracheostomy. **Tool (II):** Observational checklists to assess nurses' practices in care of children with tracheostomy. **Results:** Nearly three quarters of the studied nurses had good knowledge level in post program implementation. Also, the majority of the studied nurses had competent practice in post program implementation regarding care of children with tracheostomy. **Conclusion:** Educational program was effective in improving nurses' performance regarding care of children with tracheostomy. There was a positive correlation between nurses' total level of knowledge and practices pre and post program implementation. **Recommendation:** Conducting regular educational program and workshops for nurses regarding care of children with tracheostomy.

**Keywords:** Children, Educational Program, Nurses' performance, Tracheostomy.

## Introduction:

Respiratory system is one of the vital systems in the body. Its primary purpose is the exchange of gases. Any respiratory obstruction will affect the oxygen supply to the cerebral cells leading to cerebral hypoxia which will result in deterioration of neurological status of the child and may lead to death. This is particularly important in children suffering from neurological disorders because oxygen is required for the survival of brain cells. Children who are unable to maintain own ventilation, an artificial assistance in the form of endotracheal intubation and tracheostomy may be required **(Alam et al., 2017).**

Tracheostomy in children is primarily an open surgical procedure because of the increased technical difficulty and higher risk of perioperative complications compared with adults. The trachea in children, especially in infants and neonates, is small and pliable with a tendency to collapse and the airway mucosa is more prone to edema. Percutaneous and hybrid techniques are described, but they are generally only considered to be feasible in

older children **(McGrath & Wilkinson, 2015 and Doherty et al., 2018).**

Nurses play a vital role in providing effective tracheostomy care. Child with a tracheostomy requires the support and special attention of the whole health care team. With healthcare advancement, tracheostomy care has become part of routine care in both the acute and long-term care units. Good tracheostomy management has a significant impact on the child's general well-being and quality of life. Therefore, it is important that nurses are equipped with appropriate skills and knowledge to care for children safely and competently and to avert possible complications. Inadequate knowledge, practices and poor suctioning technique may lead to nosocomial infections, prolonged hospitalization, airway complications and even death **(Billington & Luckett, 2019).**

**Significance of the study**

A tracheostomy needs extra care because it is a direct route into the lungs and therefore the air moving into the lungs will not have the benefit of warming, moistening and filtering effect of the nasal passages. Also, it is more difficult for a child with a tracheostomy to clear secretions adequately by coughing. So, care for tracheostomy site has greater importance and advantages. Also, it reduces discomfort, need for sedation, risk for trauma to wind pipe and trachea, maintains oral and bronchial hygiene as well as, makes breathing easier **(Ertugrul et al., 2016).**

Incidence of mortality rate due to inefficient tracheostomy care is about 2% which is more frequent in emergency tracheostomy, severe ill and young children. Nearly 0.4% of mortality rate was due to trachea innominate fistula and tracheal stenosis. While the tracheostomy-related mortality was 0.5% and the non-tracheostomy-related mortality was 22% **(Marykutty, 2012).** So, application of educational program for nurses regarding care of children with tracheostomy is highly required to improve nurses' performance and prevent complication related to tracheostomy in children.

**Aim of the study**

The aim of the present study was to evaluate effect of educational program on nurses' performance regarding care of children with tracheostomy.

**Research hypothesis**

1. Nurses' knowledge would be improved after program implementation.
2. Nurses' practices would be improved after program implementation.
3. There would be a statistical significant correlation between nurses' performance pre and post program implementation.

**Research design:**

A quasi- experimental design was used in the current study to plan, implement and evaluate effect of educational program on nurses' performance regarding care of children with tracheostomy.

**Research settings:**

The present study was conducted at Pediatric Intensive Care Unit (PICU) in Benha University Hospital which located in the fourth floor and consisted of 2 rooms (one room that contains 5 beds and the other one contains 4 beds) and Pediatric Intensive Care Unit (PICU) in Benha Specialized Pediatric Hospital which located in the third floor and consisted from 3 rooms (first room contains 10 beds, the second room contains 2 beds and the third room (isolation room) contains 1 bed) and Neonatal Surgical Care Units at the second floor consisted from 3 rooms (first room contains 5 beds, the second contains 8 beds and the third contains 8 beds).

**Subjects:**

A convenient sample of (70) nurses who working at the previously mentioned settings were included in the study.

A purposive sample of (48) child who had tracheostomy throughout pre and post

assessment at the previously mentioned settings regardless their characteristics.

**Tools of data collection**:

The data were collected through using the following tools pre /post educational program.

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

This tool was developed by the researcher based on scientific literature review from **(Marykutty, 2012)** and written in an Arabic language to gather data and consisted of three parts as following:

**Part (1): Personal characteristics of the studied nurses such as:** age, gender, qualification, years of experience at PICU and previous training regarding tracheostomy care.

**Part (2): Personal characteristics and the medical data of children such as:** age, gender, type of delivery, previous hospitalization, diagnosis, causes of tracheostomy, if the child undergoing ventilator, vital signs and complication of tracheostomy.

**Part (3): Nurses' knowledge regarding care of children with tracheostomy.** It encompassed (38) multiple - choice questions classified into four parts as follows:

**A-Nurses' knowledge regarding trachea,** it consisted of 3 questions in the form of multiple choice.

**B- Nurses' knowledge regarding tracheostomy,** it consisted of 8 questions in the form of multiple choice.

**C- Nurses' knowledge regarding tracheostomy tube**, it consisted of (4) questions in the form of multiple choice.

**D- Nurses' knowledge regarding tracheostomy care,** it consisted of (23) questions in the form of multiple choice.

**Scoring system:**

The scoring system for nurses' knowledge was evaluated upon fulfillment of the interviewing questionnaire as the nurses' knowledge checked with a model key answer. Therefore, the correct answer was scored (1) grade and the incorrect was scored (0). These scores were summed –up and converted into a percent score. Accordingly, the total score ranged from 0-38 (38 question×1). Nurses' total knowledge was classified as follows:

- Poor knowledge (0 < 60%).
- Average knowledge (60% < 75%).
- Good knowledge (75% ≤ 100%).

**Tool (II): Observational checklists**

This tool adapted from **Skillings & Curtis, (2011)** and modified by the researcher to assess nurses' practice regarding care of children with tracheostomy. It consisted of 8 procedures (157) step and involved the procedures of suction of tracheostomy tube (35 steps), stoma care (27 steps), changing the tracheostomy tube (29 steps), tracheostomy tube ties (13 steps), humidification (14 steps), managing tracheostomy emergencies (16 steps), emergency airway management (conscious child with tracheostomy) (16 steps) and CPR for child with a tracheostomy (7 steps).

**Scoring system:**

The scoring system for nurses' practice was evaluated upon fulfillment of the observational checklists. Therefore, A score (1) was given in the action done completely and score (0) was given in the action not done. These scores were summed –up and converted into a percent score. Total score classified as the following:

- Incompetent practice (0 < 85%).
- Competent practice (≤ 85%).

**Tools validity and reliability:**

Tools of the study were reviewed by 3 panel experts in the field of Pediatric Nursing, Faculty of Nursing, Benha University to test the face and content validity to make sure that the tools accurately measures what supposed to measure . Modifications of the tools were done according to the panel judgment on clarity of sentences, appropriateness of content and sequence of items.

Reliability for tools was applied by the researcher for testing the internal consistency of the tools. Reliability was assessed using Cranach's alpha test and was estimated as (0.78) for knowledge and (0.90) for practice.

**Ethical consideration:**

All the ethical considerations for the nurses were secured. A full explanation about the purpose and benefits of the study was informed to them at the interview, they also allowed to know that their participation is voluntary and they have the right to withdraw from the study at any time without giving any reason. In addition confidentiality and anonymity of the subjects was secured when coding the data.

**Pilot study:**

A Pilot study was carried out on 10 % of the total sample size, (7 nurses) working at previously mentioned settings, to evaluate the clarity and applicability of the tools and to determine the time needed for filling the structured questionnaire. Subjects included in the pilot study were included in the study as there were no major modifications in the study tools. The aim of pilot study was to assess clarity and relevance, understandable, applicable and easiness of items of tools and estimating the time needed in filling the different tools of data collection. The questionnaire sheets were distributed to nurses; data were gathered from nurses during their suitable time at their work site and the researcher testing the observational checklist in the study setting. Time needed was ranged from (20-30) minutes to answer questionnaire sheet and (45-60) minutes for observational checklists. The result of pilot study served in planning for the educational program implementation.

**Field work:**

Data were collected through six months from beginning of August 2020 to the end of January 2021. The researcher was available at the previously mentioned settings by rotation 3 days per week on Saturday, Monday & Wednesday for Benha University Hospital and on Saturday, Monday& Thursday for Benha Specialized Pediatric Hospital according to availability of cases in the morning and afternoon shifts to collect data using the previously mentioned tools.

The researcher was interviewed the nurses at the previously mentioned settings to assess their performance regarding tracheostomy care. The questionnaire sheet were distributed to the nurses according to availability of cases, the researcher was present all the time during filling the questionnaire sheet. The researcher observe nurse during tracheostomy care for child using observational checklists, the researcher was observing actual practice of 3-4 nurses/ day.

**The study was conducted through the following four phases:**

**I- Assessment phase** (pre planning phase):

In the beginning, the researcher interviewed each nurse, introduced herself for nurses included in the study and obtained their approval orally to participate in the study after explaining the aim of this study to them. Then, each nurse asked to fill the structured interviewing questionnaire sheet individually to collect baseline data and after that the researcher fill the

children's data from the medical sheet. Time needed for **(tool I)** was ranged from (20-30) minutes. Also, the researcher observed nurses' practice while demonstrating tracheostomy care for children and the time needed for **(tool II)** was ranged (45-60) minutes**.**

**II- Planning phase:**

This phase included analysis of the assessment phase (pre–test) findings and identification of the actual needs of the studied nurses, the researcher designed educational program for nurses about care of children with tracheostomy, taking into account the most current relevant literature.

**The general objectives**: By the end of the educational program the nurses' knowledge and practices regarding care of children with tracheostomy were improved.

**Specific objectives:** By the end of the educational program, the nurses were able to:

- Illustrate position and structure of trachea
- Identify function of trachea
- Define tracheostomy
- Mention indications for tracheostomy
- Enumerate purpose of tracheostomy
- Explain the types of tracheostomy
- Discuss complication of tracheostomy
- Define tracheostomy tube
- Identify most common tubes used for children
- Illustrate parts of tracheostomy tube.
- Identify size of tracheostomy tubes for children
- Recognize precaution used during suction.
- Identify importance of humidification.
- Clarify importance of stoma care.
- Recognize suitable time for tie change and tube change
- Demonstrate tracheostomy suctioning
- Apply humidification
- Practice stoma care, tie change
- Apply tracheostomy tube change
- Implement emergencies for tracheostomy
- Apply CPR for children with tracheostomy

**III- Implementation phase:**

This phase was achieved through ten sessions (three sessions for theoretical part and seven sessions for the practical part) to be conducted for each group separately at a period of 3 days. Each session started by a summary of the previous session and objectives of new one. A schedule for nurses developed included date, time, place, topics and duration of each session. It was challenging to take whole nurses at the same time; so, they divided into (10) groups of 7 nurses in each session, take into consideration precautionary measures.

**Precautionary measures are taken into consideration during data collection and sessions including:**

- Personnel protective materials such as a face mask, gloves, antiseptic solution for hand hygiene.
- Personal distancing to maintain a minimum 1.5m distance.
- Avoiding shaking hands or hugging.
- Always cover the mouth while sneezing and coughing to prevent droplet transmission.
- Avoid touching one’s mouth, nose or eyes to prevent the spread of infection.

These are the most important precautionary measures to control the rapid transmission of infection during sessions.

The studied nurses (70 nurses) were divided into 10 groups in two hospitals; each group consisted of 7 nurses. The total number of sessions was 10 session (3 sessions for theoretical part and 7 sessions for practical part). The duration of sessions ranged from 45- 60 minutes for both theoretical and practical session for three days per week on Saturday, Monday & Wednesday for Benha University Hospital and on Saturday, Monday& Thursday for Benha Specialized Pediatric Hospital according to availability of cases in the morning shift. The program has taken 8 hours for each group. The theoretical sessions were started from 11:00 AM to 12.00 PM. The theoretical sessions focused on knowledge about the definition of tracheostomy, tracheostomy types, purpose, indications, complications, tracheostomy tube types and nurses' care for tracheostomy. The researcher continued to reinforce the acquired information, answered any raised questions and gave feedback. The sessions were projected to the nurses using a laptop, data show and booklet. The practical sessions were started on the same 3 days from 12.30 PM to 1.30 PM. The practical parts cover the procedures related to tracheostomy care. Also, the strategy of teaching program was determined by; choosing the appropriate teaching method in the form of (lecture, small-group discussion, demonstration and remonstration) and choosing the appropriate teaching medium in the form of (handout, audiovisual material).

**Evaluation phase:** After the implementation of the program, the nurses' knowledge and practice evaluated immediately. The post-tests administered using the same pretest data collection tools. This phase took one month.

**Statistical analysis:**

Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 25. The obtained data were organized, analyzed and represented in tables and graphs as required. Data were presented using descriptive statistics in the form of Number, frequency distribution for description of qualitative data was done, chi square test was used to compare data between the different time points. Pearson's Correlation coefficient (r), was used to the relationship between the variables. The relationship between personal data and study variables was tested using chi square test. statistical significant was considered at P-value $\leq 0.05$, highly significant at P-value $\leq 0.001$, insignificant at P-value $> 0.05$

**Results:**

**Table (1):** Shows that, more than two fifths (42.9%) of the studied nurses were in the age group of 20- < 25 years old ($\bar{x}$ ±SD 26.12± 3.81 years). Concerning gender of the studied nurses, the majority (88.6%) of the studied nurses were females. Regarding academic qualification, less than half (48.6%) of the studied nurses had graduated from technical institute of nursing. Also, 44.3% of them had 5- < 10 years of experience in PICU and all (100%) of them didn't attend any training courses regarding care of children with tracheostomy.

**Table (2):** Clarifies that, one third (33.3%) of the studied children were in the age group of 1- < 3 years old ($\bar{x}$ ±SD 3.29±1.83 years) and three quarters (75.0 %) of them were males. Also, more than half (58.3%) of the studied children were delivered normally.

**Figure (1):** Views that, nearly three quarters (74. 3%) of the studied nurses had good knowledge level in post program implementation. While, the vast minority

(5.7%) of them had good knowledge level in pre-program implementation.

**Figure (2):** Illustrates that, the majority (88.6%) of the studied nurses had competent practice in post program implementation. While, more than one quarter (27.1%) of them had competent practice level in preprogram implementation.

**Table (3):** Indicates that, there was highly statistical significant relationship between nurses' total knowledge level and both gender and their academic qualification in preprogram implementation at $p \leq 0.001$. While, there was statistical significant relationship between nurses' total knowledge level and age, gender, academic qualification and years of experience at PICU in post program implementation at $p \leq 0.05$.

**Table (4):** Indicates that, there were highly statistical significant ($p \leq 0.001$) relationships between nurses' total practice level with both their age and years of experience at PICU and statistical significant ($p \leq 0.05$) relationships between nurses' total practice level with both gender and academic qualification in preprogram implementation and between nurses' total practice level with their age, gender, academic qualification and years of experience at PICU in post program implementation.

**Table (5):** Shows correlation between nurses' total knowledge and total practice pre and post program implementation. It revealed that there was positive correlation between nurses' total level of knowledge and practice in pre and post program implementation.

**Table (1): Percentage distribution of the studied nurses according to their personal characteristics (n=70).**

| Nurses' personal characteristics | Studied nurses (n =70) | |
|---|---|---|
| | No. | % |
| **Age in years** | | |
| 20-< 25 | 30 | **42.9** |
| 25-< 30 | 23 | 32.8 |
| 30-≤ 35 | 17 | 24.3 |
| **$\bar{x}$ ±SD** | **26.12± 3.81** | |
| **Gender** | | |
| Male | 8 | 11.4 |
| Female | 62 | **88.6** |
| **Academic qualification** | | |
| Diploma of secondary nursing degree | 24 | 34.3 |
| Technical institute of nursing | 34 | **48.6** |
| Bachelor of nursing science | 12 | 17.1 |
| **Years of experience at PICU** | | |
| < 1 year | 4 | 5.7 |
| 1- < 5 years | 20 | 28.6 |
| 5-< 10 years | 31 | **44.3** |
| ≤ 10 year | 15 | 21.4 |
| **Training course about caring for children with tracheostomy** | | |
| Yes | 0 | 0.0 |
| No | 70 | **100** |

**Table (2): Percentage distribution of the studied children according to their personal characteristics (n=48).**

| Children's personal characteristics | Studied children (n=48) | |
|---|---|---|
| | No | % |
| **Age in years** | | |
| < 1 year | 12 | 25.0 |
| 1-< 3 | **16** | **33.3** |
| 3-< 6 | 8 | 16.7 |
| 6-< 9 | 5 | 10.4 |
| 9-< 12 | 4 | 8.3 |
| ≥ 12 | 3 | 6.3 |
| **$\bar{x}$±SD** | **3.29±1.83** | |
| **Gender** | | |
| Male | 36 | **75.0** |
| Female | 12 | 25.0 |
| **Type of delivery** | | |
| Normal | 28 | **58.3** |
| Caesarean section | 20 | 41.7 |

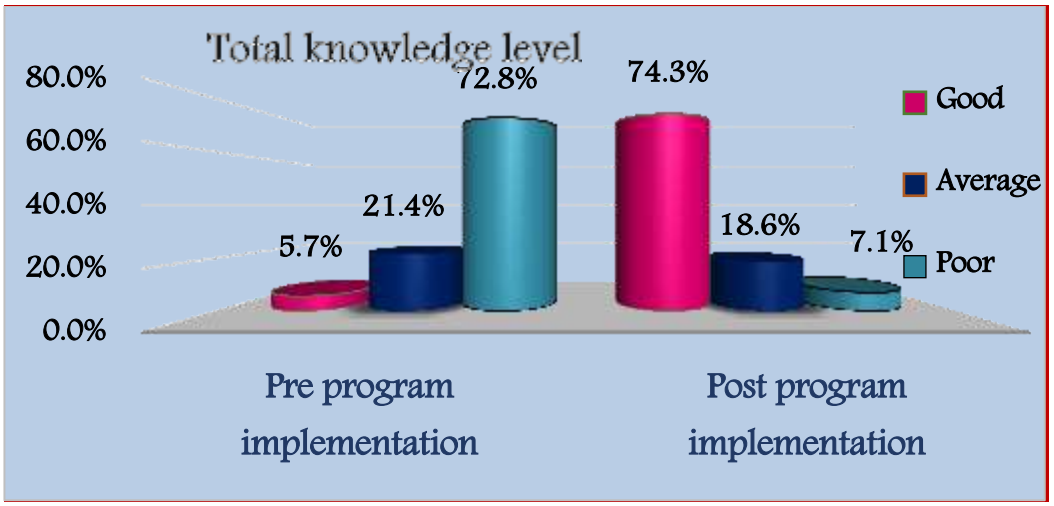


**Figure (1): Percentage distribution of the studied nurses' total level of knowledge regarding care of children with tracheostomy pre and post program implementation (n=70).**

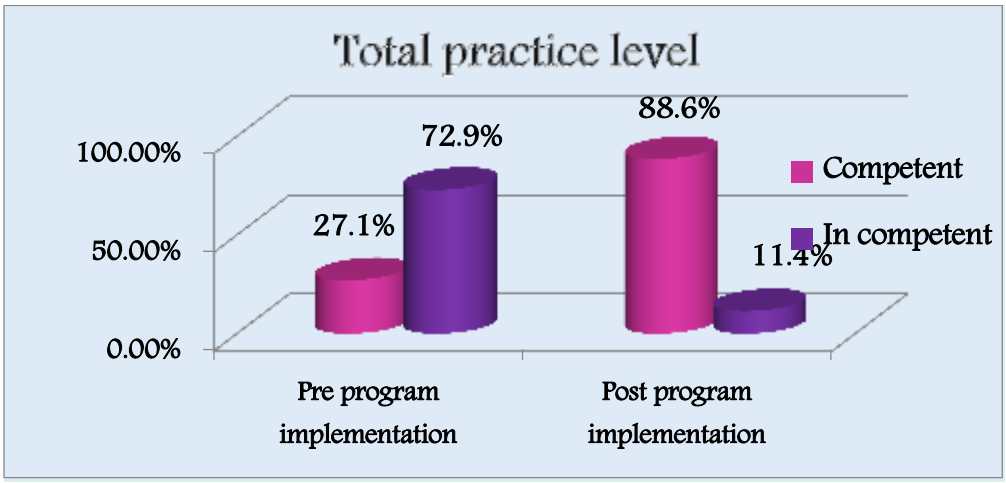


**Figure (2): Distribution of the studied nurses' total practice level pre and post educational program implementation (n=70).**

**Table (3): Relation between nurses' total knowledge level and their personal characteristics (pre /post program implementation (n=70).**

| Nurses' personal characteristics | Pre- program implementation | | | | | | | | Post program implementation | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Good N=(4) | | Average N= (15) | | Poor N= (51) | | χ2 | p | Good N= (52) | | Average N= (13) | | Poor N= (5) | | χ2 | p-value |
| | No. | % | No. | % | No. | % | | | No. | % | No. | % | No. | % | | |
| **Age in years** | | | | | | | | | | | | | | | | |
| 20-< 25 | 0 | 0.0 | 2 | 13.3 | 28 | 54.9 | 5.36 | .07ns | 17 | 32.7 | 10 | 76.9 | 3 | 60.0 | 4.62 | .01* |
| 25-< 30 | 3 | 75.0 | 6 | 40.0 | 14 | 27.5 | | | 20 | 38.5 | 3 | 23.1 | 2 | 40.0 | | |
| 30-≤ 35 | 1 | 25.0 | 7 | 46.7 | 9 | 17.6 | | | 15 | 28.8 | 0 | 0.0 | - | - | | |
| **Gender** | | | | | | | | | | | | | | | | |
| Male | 1 | 25.0 | 3 | 20.0 | 4 | 7.8 | 1.19 | .00** | 6 | 11.5 | 2 | 15.4 | 0 | 0.0 | .11 | .01* |
| Female | 3 | 75.0 | 12 | 80.0 | 47 | 92.2 | | | | 88.5 | 11 | 84.6 | 5 | 100.0 | | |
| **Academic qualification** | | | | | | | | | | | | | | | | |
| Diploma of secondary nursing degree | 0 | 0.0 | 4 | 26.7 | 20 | 39.2 | 37.65 | .00** | 12 | 23.1 | 8 | 61.5 | 4 | 80.0 | 6.79 | .03* |
| Technical Institute of nursing | 2 | 50.0 | 4 | 26.7 | 28 | 54.9 | | | 28 | 53.8 | 5 | 38.5 | 1 | 20.0 | | |
| Bachelor of nursing science | 2 | 50.0 | 7 | 46.7 | 3 | 5.9 | | | 12 | 23.1 | 0 | 0.0 | 0 | 0 | | |
| **Years of experience at PICU** | | | | | | | | | | | | | | | | |
| <1 year | 0 | 0.0 | 0 | 0.0 | 4 | 7.8 | 2.42 | .09ns | 1 | 1.9 | 3 | 23.1 | 0 | 0.0 | 4.59 | .01* |
| 1< 5 years | 1 | 25.0 | 5 | 33.3 | 14 | 27.5 | | | 14 | 26.9 | 2 | 15.4 | 4 | 80.0 | | |
| 5-< 10 years | 2 | 50.0 | 10 | 66.7 | 19 | 37.2 | | | 24 | 46.2 | 6 | 46.1 | 1 | 20.0 | | |
| ≤ 10 year | 1 | 25.0 | 0 | 0.0 | 14 | 27.5 | | | 13 | 25.0 | 2 | 15.4 | 0 | 0.0 | | |

(**) Highly statistical significant at P ≤ 0.001 (*) A statistical significant at P ≤ 0.05 (ns) No statistical significant at P > 0.05

**Table (4): Relation between nurses' total practice level and their personal characteristics pre and post program implementation (n=70).**

| Nurses' personal characteristics | Preprogram implementation | | | | | | Post program implementation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Competent N=(19) | | Incompetent N= (51) | | χ2 | P-value | Competent N= (62) | | Incompetent N= (8) | | χ2 | p-value |
| | No. | % | No. | % | | | No. | % | No. | % | | |
| **Age in years** | | | | | | | | | | | | |
| 20-< 25 | 4 | 21.0 | 26 | 51.0 | 25.46 | .00** | 28 | 45.2 | 2 | 25.0 | 5.62 | .01* |
| 25-< 30 | 8 | 42.1 | 15 | 29.4 | | | 20 | 32.2 | 3 | 37.5 | | |
| 30- ≤ 35 | 7 | 36.9 | 10 | 19.6 | | | 14 | 22.6 | 3 | 37.5 | | |
| **Gender** | | | | | | | | | | | | |
| Male | 1 | 5.3 | 7 | 13.7 | .43 | .01* | 6 | 9.7 | 2 | 25.0 | 7.79 | .03* |
| Female | 18 | 94.7 | 44 | 86.3 | | | 56 | 90.3 | 6 | 75.0 | | |
| **Academic qualification** | | | | | | | | | | | | |
| Diploma of secondary nursing degree | 6 | 31.6 | 18 | 35.3 | 4.22 | .02* | 20 | 32.3 | 4 | 50.0 | 4.23 | .02* |
| Technical institute of nursing | 9 | 47.4 | 25 | 49.0 | | | 32 | 51.6 | 2 | 25.0 | | |
| Bachelor of nursing science | 4 | 21.0 | 8 | 15.7 | | | 10 | 16.1 | 2 | 25.0 | | |
| **Years of experience at PICU** | | | | | | | | | | | | |
| < 1year | 0 | 0.0 | 4 | 7.8 | 40.6 | .00** | 2 | 3.2 | 2 | 25.0 | 3.59 | .01* |
| 1< 5 years | 4 | 21.0 | 16 | 31.4 | | | 20 | 32.3 | 0 | 0.0 | | |
| 5- < 10 years | 9 | 47.4 | 22 | 43.2 | | | 30 | 48.4 | 1 | 12.5 | | |
| ≤ 10 years | 6 | 31.6 | 9 | 17.6 | | | 10 | 16.1 | 5 | 62.5 | | |

(**) Highly statistical significant at P ≤0.001 (*) A statistical significant at P ≤ 0.05

**Table (5): Correlation between nurses' total knowledge and total practice pre and post program implementation (no=70).**

| Pearson Correlation | Total nurses' knowledge | | | |
|---|---|---|---|---|
| | Preprogram implementation | | Post program implementation | |
| | r | p- value | r | p-value |
| **Total nurses' practice** | .516 | .00** | .62 | .01* |

Correlation coefficient (r) (**) Highly statistical significant at P ≤ 0.01 (*) A statistical significant at P ≤ 0.05

**Discussion**

Tracheostomy is one of the oldest and most commonly performed surgical procedures among critically ill children. Children require tracheostomy for many different reasons. Children with a chronic tracheostomy constitute an important subgroup of children who are at risk for airway compromise. Although, tracheostomy in children is more challenging when compared to those performed in adults and it is associated with higher rates of morbidity and mortality. Over more, the risk of complications related to tracheostomy increases with age among children **(Ang et al., 2015 & Özmen et al., 2019).**

Nurses have most contact with tracheostomized children; therefore, their role in providing safe and effective care cannot be overestimated. The nurse who is accountable for giving care for children with tracheostomy ; require basic skills such as; appropriate respiratory assessment, humidification, perform airway suction, stoma care, management of tube blockage or displacement and emergency management **(Babiker, 2016).**

The current study was aimed to evaluate effect of educational program on nurses' performance regarding care of children with tracheostomy.

On the light of the current study findings, concerning personal characteristics of the studied nurses, it was found that, more than two fifths of the studied nurses were in the age group 20- < 25 years old and most of them were females. This finding was supported by the finding of **Patil, (2016)** who carried out a study "To assess the knowledge regarding tracheostomy care among the staff nurses working at KLES Dr. Prabhakar Kore Hospital and MRC, Belgaum, Karnataka with a view to develop information booklet on tracheostomy care", who reported that, the majority of the staff nurses were female and more than half of them belonged to the age group between 20 -25 years.

On the other hand, this result disagreed with **Jacob & Ramesh, (2015)** who carried out a study about "Efficacy of planned teaching on knowledge regarding tracheostomy suctioning among staff nurses" who reported that, more than three quarters of staff nurses were in the age group of 20- 25 years and more than half of them were females. The researcher clarified this difference as, the greater fraction of the nurses in Egypt were females and may also related to the studying of nursing in Egyptian universities were exclusive for females only till few years ago.

Regarding academic qualifications of the studied nurses, the current study showed that, less than half of the studied nurses had graduated from technical institute of nursing. Also, more than two fifths of them had 5- <

10 years of experience in PICU. This finding was disagreed with the finding of **Patil, (2016)** who found that, more than half of the staff nurses were Bachelor of nursing science and the majority of them had 1-5 years of work experience.

As regard nurses' attending training courses about caring for children with tracheostomy. The present study clarified that, all of the studied nurses didn't attend any training courses regarding care of children with tracheostomy. This finding was supported by **Dhaliwal et al., (2018)** in a study which entitled " A descriptive study to assess the knowledge and skills on tracheostomy care among staff nurses working in selected hospitals of district Mohali, Punjab", who mentioned that, the majority of staff nurses have not attended educational program related to tracheostomy care. The researcher believes that, the hospital should provide continuous training for pediatric intensive care nurses to gain and update their knowledge and practices about tracheostomy.

According to personal characteristics of the studied children, the present study showed that, one third of the studied children were in the age group 1- < 3years old with mean age 3.29±1.83 years. This finding incomparable with **Schweiger et al., (2017)** who conducted a study about "Tracheostomy in children: A ten-year experience from a tertiary center in southern Brazil" and found that more than half of the studied children was under one year of age. Also, **Wood et al., (2016)** who conducted a study about " Tracheostomy in children admitted to pediatric intensive care" reported that, less than half of children younger than 12 months.

As regards to the gender of the studied children, the current study revealed that, three quarters of them were males. This finding was supported by **Schweiger et al., (2017)** who found that, nearly two thirds of children were males. While, this finding was incongruent with the study performed by **Wakeham et al., (2014)** who conducted a study entitled "Use of tracheostomy in the PICU among patients requiring prolonged mechanical ventilation" who reported that, more than half of studied infants were males.

According to total level of knowledge of the studied nurses regarding care of children with tracheostomy. The present study revealed that, the vast minority of the studied nurses had good knowledge level in pre-program implementation. This finding inconsistent with **Pradhan et al., (2018)** who conducted a study about "Knowledge regarding tracheostomy care among nursing students", who indicated that majority of the respondent had good knowledge regarding tracheostomy care. Another study carried by **Patil, (2016)** who revealed that, majority of staff nurses had average knowledge. The researcher could explain this result as, the absence of training courses regarding tracheostomy care and less than one fifth of the studied nurses had Bachelor's degree.

Regarding the studied nurses' total practice level, the present study illustrated that, more than one quarter of nurses had competent practice level in pre program implementation. This result didn't agree with **El-Gawab, (2017),** who found that, more than two thirds of nurses had satisfied level of total practice about tracheostomy care. The researcher clarified this point as, this results might be due to lack of training courses regarding care of children with tracheostomy

and fewer cases of tracheostomy in children that make nurses incompetent in caring of children.

Concerning the relation between the studied nurses' total knowledge and their personal characteristics. The present study revealed that, there was highly statistical significant relationship between nurses' total knowledge level with their gender and their academic qualification in preprogram implementation. This finding disagreed with **Dhaliwal et al., (2018)** who found that, there was a significant association of knowledge with their age, experience/duration of work in the present area (in years). Moreover, there is no significant association of knowledge with educational qualification. From the researcher point of view, this indicates that high level of education for nurses, affect on their level of awareness and efficient of care.

Also, this finding was in the same line with the study performed by **Gaterega et al. (2021)**, who founded that, there were no significant demographic factors associated with knowledge. Another study done by **Khanum et al., (2021),** who carried out a study about" Assessment of knowledge regarding tracheostomy care and management of early complications among healthcare professionals" mentioned that, no statistical significant association of knowledge regarding tracheostomy care with age, gender, qualification and years of nurses' experience.

Concerning the relation between the studied nurses' total practice level and their personal characteristics, the present study revealed that, there were highly significant statistical relationships between nurses' total practice level with both their age and years of experience in PICU in preprogram implementation. This finding was similar with **Naeem, (2021)** who carried out a study about" Nurses' performance regarding care of patients with tracheostomy" who found that, there was highly significant relation between nurses' total practices and their age and years of experience.

On the other hand, this finding not parallel to **Dhaliwal et al., (2018)** who found that, there was no significant association of skills of tracheostomy care with age, gender, educational qualification, experience/duration of work in the present area and educational program attended on tracheostomy care. From the researcher point of view, this indicates that nurses' years of experience in PICU, affect on level of skills regarding any procedure.

It was observed from the current study that there was highly significant statistical positive correlation between nurses' total level of knowledge and total practice level in pre program implementation. This finding was in the same context with **Dhaliwal et al., (2018),** who obvious that, there was a mild positive correlation between knowledge and skills on tracheostomy care when calculated by using Karl Pearson correlation formula. In the same line, this finding was supported by **El-Gawab, (2017)** who studied " Quality of nursing care on patients with tracheostomy", who mentioned that, there was a statistical significant positive correlation between total nurses' knowledge and total nurses' practice. The researcher clarified this point scientifically as, implying that better knowledge about the tracheostomy care has a positive effect on the practices exercised by nurses.

**Conclusion**

Educational program was effective in improving nurses' knowledge and practices level regarding care of children with tracheostomy. In addition, there was a positive correlation between nurses' total level of knowledge and practices pre and post preprogram implementation.

**Recommendations**

- Conducting regular educational program and workshops for nurses regarding care of children with tracheostomy.
- Developing guidelines for nurses about caring for children with tracheostomy to reduce its related complications.
- Further studies should be conducted to replicate the study on a larger sample size for generalization of results.

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## تأثير برنامج تعليمي على اداء الممرضين تجاه رعاية الاطفال الذين لديهم شق حنجري

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إن تحسين الرعاية بالشق الحنجري وتوفير الممارسة الأمنة، يتحقق ذلك من خلال؛ الخبرات الجيدة، المهارات، المعرفة، توفير أفضل أساليب / طرق التعلم ومعرفة أحدث التطورات في العناية بالشق الحنجري. لذلك هدفت هذه الدراسة إلى تقييم مدى تأثير برنامج تعليمي على أداء الممرضين تجاه رعاية الاطفال الذين لديهم شق حنجري. وقد تم استخدام التصميم شبة التجريبي لإجراء الدراسة. وقد اجريت الدراسة على جميع الممرضين المتاحين (٧٠ ممرض/ه) داخل وحدة العناية المركزة بمستشفى بنها الجامعي وداخل وحدة العناية المركزة للاطفال ووحدات العناية الجراحية لحديثي الولادة بمستشفى الاطفال التخصصي ببنها. حيث كشفت النتائج عن أن أكثر من خمسي الممرضين (٤٢.٩%) تتراوح اعمارهم بين٢٠ الى اقل من ٢٥ سنه بمتوسط عمر٢٦.١٢ ± ٣.٨١. ووجد أن غالبية (٨٨.٦%) الممرضين موضع الدراسة من الإناث. وأن هناك ارتباط ايجابي بين مستوى المعلومات الكلي للمرضين ودرجة الممارسة تجاه رعاية الاطفال الذين لديهم شق حنجري قبل وبعد تنفيذ البرنامج. كما أوصت الدراسة بأهمية تنفيذ برامج تعليمية منتظمة وورش عمل للممرضين تجاه رعاية الاطفال الذين لديهم شق حنجري.