

# Nurses' Knowledge and Practice Regarding Chest Physiotherapy Among Children with Pneumonia

Fatma Fathy Rabea <sup>1\*</sup>, Iamiaa Ahmed Elsayed<sup>2</sup> and Eman Abdelfattah Ali<sup>3</sup>

<sup>1,2,3</sup>Pediatric Nursing, Faculty of Nursing, Ain Shams University, Cairo, Egypt.

<sup>1</sup>Dr.Fatma.Fathy.Rabea@nursing.asu.edu.eg, <sup>2</sup>Dr.Iamiaa.elsayed@nursing.asu.edu.eg,

<sup>3</sup>dr.emanabdefatah@nursing.asu.edu.eg

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Ahmed Elsayed, Eman  
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## ABSTRACT:

**Aim** This study aimed to assess nurses' knowledge and practice regarding chest physiotherapy among children with pneumonia. **Methodology** A descriptive research design was employed to assess nurses' knowledge and practices concerning the care of the children with pneumonia and treated with chest physiotherapy. The study included a total of 80 nurses and accompanying the children (one per a child) participated in the study and was conducted at the intensive care units and ward of the Children's Hospital affiliated with Ain Shams University Hospitals. Results More than half of the participating nurses (61.3%) demonstrated a good level of knowledge regarding pneumonia and chest physiotherapy. Additionally, less than one third (32.5%) of them were competent regarding caring for children with pneumonia. **Conclusion** Based on the study findings, there is a highly statistically significant relation between the studied nurses' total knowledge and their years of experience, with a p-value <0.001. While there is a statistically significant relation between the studied nurses' total practice and their qualifications, with a p-value <0.05.

**Keywords:** children, Knowledge, Practices, pneumonia, chest physiotherapy.

## Introduction

Pneumonia is a form of acute respiratory infection that affects the lungs and it is defined as inflammation of the alveoli and interstitial tissues of the lungs by an infectious agent. Pneumonia remains the single largest cause of hospitalization and death among children under the age five years globally and in Egypt specifically. (2) There is high prevalence of community-acquired pneumonia among pediatric populations. In Egypt, recent studies conducted in 2025—particularly in the Delta region—highlighted a persistently, with pneumonia ranking among the top causes of hospital admissions and child mortality. Worldwide the incidence of

approximately 1,400 cases per 100,000 children annually, despite advances in vaccination and healthcare access, pneumonia continues to account for over 700,000 deaths in children under five each year, including nearly 190,000 deaths, making it the foremost infectious killer of young children (16). Chest physiotherapy is an important part of the treatment of most respiratory illnesses in children. It is also utilized for children who have chronic respiratory or neuromuscular problems. The major purpose of children's chest physiotherapy is to assist eliminate tracheobronchial secretions, which reduces airway resistance, improves gas exchange, and makes breathing easier. (24). One

of the common supportive treatments used in pediatric pneumonia is chest physiotherapy. This intervention has been shown to effectively mobilize tracheobronchial secretions, improving clinical indicators such as respiratory rate and oxygen saturation. Chest physiotherapy serves as an important adjunctive therapy in managing pediatric respiratory diseases. Its primary goal is to help eliminate mucus from the airways, thereby reducing airway resistance, enhancing gas exchange, and facilitating easier breathing. Techniques used in pediatric physiotherapy—though similar to those in adults—include postural drainage, clapping, vibration, percussion, deep breathing, and effective coughing, all aimed at enhancing mucociliary clearance<sup>(20)</sup> Nurse role for children with pneumonia start with an assessment of the pediatric patient's medical history, performing respiratory assessment every four (4) hours, physical examination, and arterial blood gas (ABG) measurements. Supportive interventions include oxygen therapy, suctioning, encourage coughing, deep breathing, adequate hydration, and make cold compress. <sup>(22)</sup> Nurses in pediatric intensive care unit (PICU) provide direct and individualized nursing care to the pediatric patients based on the application of scientific nursing principles. Physiotherapy may be one of the duties of the PICU nurse which requires good training and understanding of its principles. The nurse should be aware of the pediatric patient's diagnosis as well as the lung lobes or segments involved the cardiac status and any structural deformities of the chest wall and spine. Auscultating the chest before and after the procedure helps to identify the areas needing drainage and to assess the effectiveness of treatment. <sup>(5)</sup>

### Materials and methods

- A descriptive cross-sectional study design was employed to evaluate nurses' knowledge and practices concerning the management of children with pneumonia and Treat with chest physiotherapy. Inclusion criteria included Children suffering from

pneumonia and need chest physiotherapy as a time of treatment. Exclusion criteria included Children with other respiratory problem. Participants were recruited using a purposive sample composed of 80 nurse who are providing direct care for children with pneumonia needed chest physiotherapy. (one per a child) participated in the study at the Children's Hospital affiliated with Ain Shams University Hospitals. The researcher conducted individual interviews with each nurse at the units and personally completed the questionnaire. The questionnaire consists of two parts that include: one concerned with characteristics of the studied nurses and children and the other concerned with assessment of nurses' knowledge regarding pneumonia and chest physiotherapy.

### Data Collection:

Upon obtaining formal authorization to conduct the research, the principal investigator met with the hospital director to acquire institutional permission and coordinate a suitable schedule for data gathering. The fieldwork phase commenced in February 2025 and continued through the end of July 2025. Data collected over a period of 6 months, during which the investigator was present at the research site two days per week (Sundays and Mondays) from 8:00 a.m. to 2:00 p.m. during the morning shift to conduct data gathering. The researcher began by introducing herself to each nurse provided them with a comprehensive research background. The researcher clarified the purpose of the research and outlined the expected outcomes to each nurse individually. The researcher was interviewed with each nurse individually and was filling the questionnaire to assess their knowledge about care of children with pneumonia and treat with chest physiotherapy. Researcher took 15-20 minutes to complete the questionnaire sheet for each nurse. The researcher used checklists to evaluate the practices of nurses in the care of their children with pneumonia and treat with chest physiotherapy.

**Tools of data collection:****nurses' knowledge concerning care of children with pneumonia and treated with chest physiotherapy**

The knowledge questionnaire was designed by the investigator after conducting a comprehensive review of the relevant literature to ensure its validity in assessing nurses' knowledge related to caring for children with pneumonia and treated with chest physiotherapy: It was written in the form of close ended questions. The questions composed of 13 related to nurses' knowledge about pneumonia which comprised definition of pneumonia, etiology, predisposing factors, mode of transmission, clinical manifestations, assessment of child, position, suction, vital signs, diagnostic measures, treatment options, complications, care of child suffer from pneumonia. and 13 questions related to nurses' knowledge about chest physiotherapy which included definition of CPT, goal of CPT, duration of CPT, best time for CPT, assessment before CPT, the best position of CPT, indication of CPT, disease need of CPT to treated, contraindication of CPT, types of CPT, indication of vibration, care during

**Scoring system:** Scoring system of nurses' knowledge evaluated based on a model key answer. Consequently, each correct answer was given one mark, while each incorrect or unknown answer was given zero. The total nurses' knowledge scores were 26 marks. These scores were summed up and converted into a percentage score which was classified into 2 levels as follow:

- satisfactory knowledge if score  $\leq 85\%$  ( $\leq 22$  marks).
- unsatisfactory knowledge if score  $> 85\%$  ( $> 22$  marks).

**nurses' practice concerning care of children with pneumonia and treated with chest physiotherapy**

It was adapted from [8,11,13] It was utilized to evaluate used to assess actual nursing practice related to respiratory problem. The total checklists were 5 practices namely: practices chest

physiotherapy (16 steps), practices oxygen therapy (16 steps), practices Breathing exercise (9 steps), practices suctioning (31 steps), practices related to Nebulizer (19steps),

**Scoring system:**

The total number of steps in the checklists were 91 steps. Score 1 was given if action done correctly and score zero was given if action done incorrectly or not done. The total practices scores were 91(100%). These scores were summed up and converted into a percentage score and accordingly the total score was categorized as Competent, if score  $\leq 90\%$  ( $\leq 81$  grade) and Incompetent if score  $> 90\%$  ( $> 81$  grade).

**Data analysis:**

Following the completion of data collection, the gathered data were systematically organized, tabulated, and subjected using statistical package for social sciences version 22.0 (SPSS inc., chicago,iiiinois,USA) qualitative data were expressed as frequencies, percentages. quantitative data were expressed as means, and standard deviations, were employed to summarize the data. Categorical variables were analyzed using the Chi-square ( $\chi^2$ ) test to determine relationships. For continuous variables, the Pearson correlation coefficient ( $r$ ) was utilized to examine the relationships between variables. The level of statistical significance was determined based on the p-value: a p-value less than 0.05 was considered statistically significant, a p-value less than 0.001 was regarded as highly statistically significant, and a p-value greater than 0.05 indicated no statistical significance.

**Ethical approval**

Approval for conducting the study was obtained from the Scientific Ethical Research Committee at the Faculty of Nursing, Ain Shams University (26.04.1250) prior to initiating data collection. The researcher provided all participating nurses with a clear explanation of the study's aims and objectives before the commencement of data gathering. Written informed consent was secured from each nurse before their enrollment in the study. Confidentiality of all collected data was strictly maintained, with assurances that

information would be used solely for research purposes. The researcher committed to preserving both anonymity and confidentiality of participant information throughout the study. Additionally, nurses were informed of their right to withdraw from the study at any point without facing any consequences.

## Results

In the results of the study, we note that 55% of the studied nurses are aged 30 to less than 40 years with a mean age of  $32.75 \pm 6.22$  years, 63.75% of them are females, and 62.5% have a Health Technical Institute qualification. Also, more than half of studied nurses, 52.5% have 5 to less than 10 years of experience, and 61.25% of them worked in the Intensive Care Unit **See Table 1**, 66.25% of the studied children are aged 1 to less than 5 years, with a mean age of  $2.91 \pm$

0.55 years, more than half of them are males, 57.5%, and the majority 92.5% are in nursery school, Regarding child ranking, 45% the highest percentage is the first. More than half of studied children are hospitalized once, 58.75%, and 52.5% of them have a hospital stay of 5 to less than 10 days, with a mean duration of  $6.50 \pm 1.24$  days **See Table 2**. 61.3% of the studied nurses have a satisfactory level of total knowledge, while 38.8% demonstrates an unsatisfactory level. reflecting that more than half of the participants possessed adequate knowledge overall **See Table 3**, 67.5% of the studied nurses have incompetence level of total practice, while only 32.5% are competent **See Table 4**. A highly statistically significant positive correlation between studied nurse's total knowledge and total practice regarding caring for children with pneumonia **See Table 5**

Table 1 Distribution of the studied nurses according to their characteristics (n=80).

| Nurses' characteristics           |                 | Total no = 80 |       |
|-----------------------------------|-----------------|---------------|-------|
|                                   |                 | No.           | %     |
| <b>Age(years)</b>                 |                 |               |       |
| <20                               |                 | -             | -     |
| 20<30                             |                 | 27            | 33.75 |
| 30<40                             |                 | 44            | 55    |
| ≥40                               |                 | 9             | 11.25 |
|                                   | <b>Mean ±SD</b> | 32.75±6.22    |       |
| <b>Sex</b>                        |                 |               |       |
| Male                              |                 | 29            | 36.25 |
| Female                            |                 | 51            | 63.75 |
| <b>Qualification</b>              |                 |               |       |
| Diploma in Nursing                |                 | 13            | 16.25 |
| Health Technical Institute        |                 | 50            | 62.5  |
| Bachelor of Nursing               |                 | 17            | 21.25 |
| Postgraduate                      |                 | -             | -     |
| <b>Years of experience /years</b> |                 |               |       |
| < 5                               |                 | 17            | 21.25 |
| 5<10                              |                 | 42            | 52.5  |
| ≥10                               |                 | 21            | 26.25 |
|                                   | <b>Mean ±SD</b> | 8.51±1.62     |       |
| <b>Department</b>                 |                 |               |       |
| Emergency                         |                 | 14            | 17.5  |
| Inpatient                         |                 | 17            | 21.25 |
| Intensive Care Unit               |                 | 49            | 61.25 |

Table 2 Distribution of the Studied Children according to their Characteristics (n=80).

| Children Characteristics                 | No | %     |
|------------------------------------------|----|-------|
| <b>Age /years</b>                        |    |       |
| <1                                       | 19 | 23.75 |
| 1<5                                      | 53 | 66.25 |
| 5>10                                     | 8  | 10.0  |
| ≥10                                      | -  | -     |
| <b>Mean ±SD 2.91±0.55</b>                |    |       |
| <b>Sex</b>                               |    |       |
| Male                                     | 46 | 57.5  |
| Female                                   | 34 | 42.5  |
| <b>Educational level</b>                 |    |       |
| Nursery                                  | 74 | 92.5  |
| Primary                                  | 6  | 7.5   |
| Preparatory                              | -  | -     |
| Secondary                                | -  | -     |
| <b>Child ranking</b>                     |    |       |
| First                                    | 36 | 45    |
| Second                                   | 24 | 30    |
| Third                                    | 20 | 25    |
| Forth & more                             | -  | -     |
| <b>Frequency of hospitalization</b>      |    |       |
| Once                                     | 47 | 58.75 |
| Twice or more                            | 33 | 41.25 |
| <b>Duration of hospitalization(days)</b> |    |       |
| <5                                       | 31 | 38.75 |
| 5>10                                     | 42 | 52.5  |
| ≥10                                      | 7  | 8.75  |
| <b>Mean ±SD 6.50±1.24</b>                |    |       |

Table 3 Distribution of the studied nurses' total knowledge regarding pneumonia and chest physiotherapy (n=80).

| Level of total knowledge | No. | %     |
|--------------------------|-----|-------|
| Satisfactory             | 49  | 61.3  |
| Unsatisfactory           | 31  | 38.8  |
| Total                    | 80  | 100.0 |

Table 4 Distribution of the Studied nurses' total practice regarding caring of children with pneumonia (n=80)

| Level of total practice | No. | %    |
|-------------------------|-----|------|
| Competent               | 26  | 32.5 |
| Incompetent             | 54  | 67.5 |

Table 5 Correlation between the studied nurse's total knowledge, practice, and attitude regarding caring for children with pneumonia.

| Total score of knowledge |         | Total score of practice |
|--------------------------|---------|-------------------------|
| Total score of knowledge | r-value | 0.520                   |
|                          | p-value | <0.001**                |
|                          | N       | 80                      |
| Total score of practice  | r-value | 0.520                   |
|                          | p-value | <0.001**                |
|                          | N       | 80                      |

r-Pearson Correlation Coefficient; \*p-value <0.05 significant correlation; \*\*p-value <0.001 highly significant

### Discussion

The present study aimed to evaluate nurses' knowledge and practice regarding chest physiotherapy among children with pneumonia, utilizing a descriptive research design. The findings of the recent study showed that more than half of the studied nurses aged 30 to less than 40 years with a mean age of  $32.75 \pm 6.22$  years. This finding disagree with a study done by Al-Jubari, & Baez, (6) and reported that more than two thirds of the studied nurses were aged between (25–29 years) with a mean age of Mean  $\pm$  SD  $26.2 \pm 2.56$  years. From the researcher's perspective, nurses prefer working in intensive care units and are enthusiastic about their work and willing to learn.

The current study revealed that less than two thirds of them are females. This result in the same line with a study done by Kareem et al., (2023) and reported that highly percentage of them were females

Concerning the qualification of the studied nurses; the present study result noted that less than two thirds of them had a Health Technical Institute qualification. Similarly, two previous studies. Firstly, Mohamed et al., study (21) and found that near two thirds of them graduated from technical institution of nursing. Secondly, Jassm, & Aziz, study (18) in Iraq and found that half of nurses graduated of nursing institute. This may be due to the fact that the large number of nurses prefer technical nursing institution that

allow them to graduates after only two years of study and begin working immediately.

Regarding to years of experience among studied nurses; the present study results showed that more than half of studied nurses had 5 to less than 10 years of experience, and less than two thirds of them worked in the Intensive Care Unit. Disagree with two previous studies. Firstly, El-Sayed et al., (17) study and reported that less than half of the nursing staff had 1 to fewer than 3 years of experience in NICUs. secondly, Al-Waly et al., study (7) and reported that majority of them had (1-5) years of experience inside the medical pediatric ward.

According to characteristics of the studied children the current study results illustrated that two thirds of the studied children aged 1 to less than 5 years, with a mean age of  $2.91 \pm 0.55$  years, This finding contrasted with Abd Elaziz et al., study (1) and found that less than two thirds of the studied infants aged from 6 months and more while two fifths of them were less than 6 months with Mean  $\pm$ SD  $11.52 \pm 4.11$ . From the researcher point of view, these results may be due to children under five years are more susceptible to upper respiratory infections

Also, the current study results showed that more than half of studied children are males. This similar Chheng & Thanattheerakul, study (14) and reported that more than two thirds of the studied children were males.

Regarding child ranking, less than half of the studied children were the first child. This result disagree with a study performed by Elslemy et al., study (17) and found that more than half of the studied children were the second child in the family, meanwhile, and less than one third of them were first.

The current study results showed that, more than half of studied children are hospitalized once, more than half of them had a hospital stay of 5 to less than 10 days, with a mean duration of  $6.50 \pm 1.24$  days. This result contradicted with Ahmed et al., study (3) and found that one percent of children were hospitalized from 3 to 6 per year. Moreover, this result was agreed with Basiouny & Hamad, (12) who applied study in Egypt among 200 mothers and reported that less than one third of children were diagnosed with pneumonia, and more than two fifths of them were hospitalized.

Concerning to total knowledge of the studied nurses regarding pneumonia and chest physiotherapy; the present study results showed that less than two thirds of the studied nurses had a satisfactory level of total knowledge regarding pneumonia and chest physiotherapy, while less than two fifths of them had unsatisfactory level of total knowledge. From the researcher point of view this result may be due to years of experiences and level of education among studied nurses.

These findings contradicted with Yassen & Ahmed, study (26) and reported that less than one quarter of the studied nurses had good knowledge, and less than half of them had fair knowledge regarding chest physiotherapy. Moreover, Arjun et al., (9) who applied a Descriptive Cross-sectional Study and found that less than three quarters of participants had poor knowledge regarding chest physiotherapy. Additionally, Ali et al. study, (4) and revealed that three quarters of the study participants had unsatisfactory knowledge regarding preparation for chest physiotherapy, and most of the participants had unsatisfactory knowledge regarding percussion and vibration.

Also, these findings disagree with Jayanthi et al., (19) and reported that one fifth of them had adequate knowledge, less than two fifths of them had moderate Knowledge, in general more than two fifths of them had adequate knowledge regarding chest physiotherapy. Moreover, Awad & Ajil, (10) demonstrated that more than two fifths of the studied nurses had knowledge about using physiotherapy for children with pneumonia.

Concerning to total practice of the studied nurses regarding caring for children with pneumonia; the current study results denoted that more than two thirds of the studied nurses were incompetent in total practice, while less than one third of them were competent regarding caring for children with pneumonia

These findings disagreed with Saad et al., study (25) and reported that slightly more than two thirds of studied nurses did a competent practice regarding caring for pediatric patients with respiratory disorders whenever, about one third of them had incompetent total practice. From the researcher point of view this result may be due to lack of orientation program prior to work in critical areas and shortage of staff nurses specially with Bachelor degree in nursing which lead to work over load in these units. Moreover, unavailability of guideline books, lack of interest, lack of motivation and insufficient financial reward to the nurses, lack of in-service training course and lack of job description. All these contributed to the unsatisfactory practice level of nurses regarding care of pediatric patients.

Regarding correlation between the studied nurses total knowledge and practice, regarding caring for children with pneumonia; the current study result revealed that there is positive correlation between studied nurse's total knowledge and total practice, regarding caring for children with pneumonia .These result in the same line with Mohammed et al.,( 23) who found that there were statistically significant positive correlations between studied nurses' total knowledge, total practice and total attitude pre and post self-learning implementation ( $p < 0.000$ ). This finding similar to Zain ELdin et al.,

study (27) and pointed to that there was a positive correlation between total nurses' knowledge and their total practice scores in relation to caring of children suffering from pneumonia. Moreover, Mohamed et al., study (21) and revealed that there was a significant positive correlation between level of total knowledge of studied sample and their total practice regarding chest physiotherapy with lower respiratory problems immediate post and one-month post program application.

### Conclusion

Upon the findings of the current study, less than two thirds of the studied nurses had a satisfactory level of total knowledge regarding pneumonia and chest physiotherapy, while less than two fifths of them had unsatisfactory level of total knowledge and more than two thirds of the studied nurses were incompetent in total practice, while less than one third of them were competent regarding caring for children with pneumonia .also, there was a highly statistically significant relation between the studied nurses' total knowledge and their years of experience, with a p-value <0.001 While there was a statistically significant relation between the studied nurses' total practice and their qualifications, with a p-value <0.05. Moreover, there was positive correlation between studied nurse's total knowledge and total practice regarding caring for children with pneumonia.

### Recommendations

Based on the findings of the current study, the following recommendations are suggested:

- Periodic assess of nurses' performance regarding care of children undergoing chest physiotherapy.
- Encourage nurses to improve and update their knowledge and practices through attending training programs, conferences and workshops about care of children undergoing chest physiotherapy.
- A standardized clinical nursing guidelines about care of children with

pneumonia should be available in each pediatric intensive care units.

- Newly staff nursing members who provide care for pediatric patient with pneumonia and treated with chest physiotherapy in pediatric intensive care units should be well oriented with each standardized international nursing care protocols.
- Providing nurses with manual handbooks containing all necessary information about nursing procedures related to the quality of nursing care for children with pneumonia and treated with chest physiotherapy will be beneficial.
- Further study conduction on large number of nurses working at PICU at different hospitals.

### Abbreviation

#### CPT: chest physiotherapy

#### Author contribution

F.F.R, L.A.E and E.A.A participated in writing and data analysis. All authors participated in all steps of the study.

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**Data Availability** Data available in manuscript

#### Ethics approval and consent to participate

Approval for conducting the study was obtained from the Scientific Ethical Research Committee at the Faculty of Nursing, Ain Shams University with code (26.04.1250) prior to initiating data collection. The researcher provided all participating nurses with a clear explanation of the study's aims and objectives before the commencement of data gathering. Written informed consent was secured from each nurse before their enrollment in the study.

#### Ethics Accordance

The research was conducted in accordance with the Declaration of Helsinki and Belmont Report.

**Consent for publication** Not applicable

**Clinical trial number** Not applicable

**Competing interests** The authors declare no competing interests.

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