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Research Article

# A Study to Assess the Effectiveness of Structured Teaching Program on Knowledge and Practice Regarding Nebulization in Children (0–5 year) among Student Nurses

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## Abstract

**Aims:** The aim of the study was to access the knowledge and practice of student nurses toward nebulization therapy.

**Introduction:** Nebulization is an important tool in the treatment of respiratory conditions. Nurses are primary health-care providers for using the nebulizers in a hospital setting. The examination of nurse's knowledge and performance regarding the nebulizer therapy is of almost importance for proper nebulization**.**

**Methodology:** The pre-experimental research design was conducted in this study. The total sample was 60 in this study. Purposive sample technique was used. The target population is student nurses. The area of setting is Government Medical College Hospital of Ambikapur (c.g.).

**Result:** The data show that analysis of the knowledge score pre-test mean score was 9.75, mean percentage score was 1.66% and SD was 2.71, analysis of post-test knowledge mean score was 14.51, mean percentage 2% and SD was 1.76, and standard error was 0.412, paired "*t*" value was 6.85 that was found to significant at 0.05 level. Practice score and pre-test mean score was 13.08, mean percentage score was 54.5%, and SD was 2.37, analysis of post-test knowledge mean score was 17.08, mean percentage 71.16 and SD was1.42, and standard error was 0.35, paired "*t*" value was 11.42 that was found to significant at 0.05 level.

**Conclusion:** After the detailed analysis, this study leads to following conclusion that is more effective in improving knowledge and practice on regarding nebulization therapy.

**Keywords:** Children (0–5 year), knowledge, nebulization, practice, structured teaching program

## Introduction

Every child is precious for a mother. There are many dreadful diseases which endanger the life of a child. One among those is the respiratory diseases which account for high mortality among children <5 years of age.[1] Nebulization is an important tool in the treatment of respiratory conditions. Nurses are primary health-care providers for using the nebulizers in a hospital setting.[2] The examination of nurse's knowledge and performance regarding the nebulizer therapy is of utmost importance for proper nebulization.[2] The aim of the study was to access the knowledge and attitude of staff nurses toward nebulization therapy.[2] Lung is a unique organ, in spite of the constant exposure to micro-organisms and pollutants, it is kept sterile beyond the first-order bronchi. Numerous defense mechanisms including mucociliary escalator mechanism play a significant role to keep the airway sterile. When its function gets compromised, defective drainage of lung secretions results

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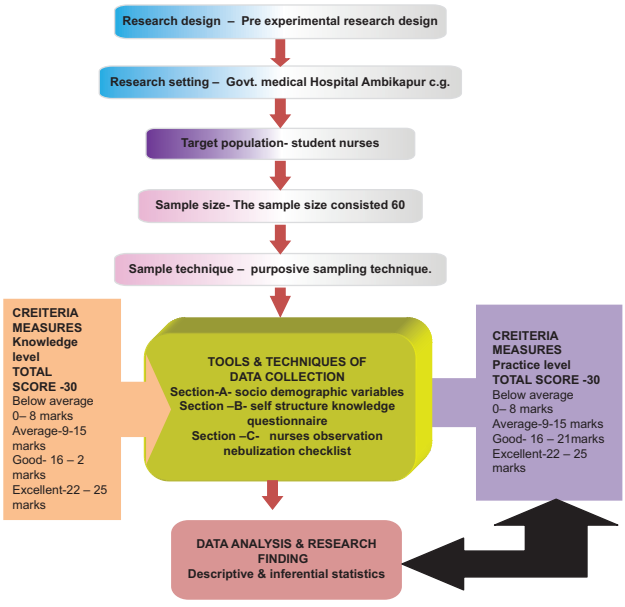
in insult to the organ. Chest physiotherapy plays an important role by promoting drainage and ensuring normal lung expansion in parenchyma lung diseases and pleural diseases.[3] Inhaled medications are the main stay of therapy for many pediatric pulmonary diseases. These therapies are given to patients who receive different types of respiratory support. Improvements in survival and development of new technologies have also changed the prognosis of many pediatric pulmonary conditions. This heterogeneous population includes pediatric patients with asthma (maintenance therapy and rescue therapy during exacerbations), patients with respiratory distress requiring invasive mechanical ventilation or non-invasive ventilation support, pediatric patients requiring transnasal support in the form of high flow nasal cannula, and spontaneously breathing tracheostomized pediatric patients.[1-5] Although pediatric patients with other conditions, such as cystic fibrosis, also use different inhaled drugs, their discussion is outside of the scope of this paper.[4]

In Chhattishgarh, the present study revealed a great lack of performance as regards to washing all parts of the nebulizer. Scores of nurses' performance ($P = 0.001$) and the majority of nurses in nursing diploma were at unsatisfactory level (82.6%).

## Methodology

The research approach selected was done using quantitative approach and the research design was pre-experimental study design which studies the observable changes that take place to establish a cause and effect relationship. The aim of this pre-experimental research is to assess the effectiveness structured teaching program regarding knowledge and practice of nebulization in children among nursing students. In the present study, pre-experimental one group pre-test and post-test research design was used. The total sample was 60 and the target population is student nurses. The setting of area is Government Medical Hospital Ambikapur C.g.

### Schematic representation of research methodology




### Development and description of the tool

#### *Section-A*

This section consists of sociodemographic variables such as age, sex, religion, area of residence, education, no of hospitalization with in past 1 year, previous knowledge regarding aerosol therapy (nebulization) for under 5 years of age, reason for past hospitalization, immunization status, weight of children, previous episode of respiratory infection, source of infection, source of information, and exposure to passive smoking at home.

#### *Section-B*

This section consists self-structured questionnaire for giving knowledge of nebulization therapy, was asked to select an appropriate doing procedure in children. It is consist of 30 questions.

The level of performance analysis in nurses will be identified through following scoring criteria.

#### Scoring key

Each correct response scores 1 mark and wrong response 0 mark.

- Maximum score – 30
- Minimum score – 0.

#### Criteria

- Below average: 0–7 marks (0–23%)
- Average: 8–15 marks (26–50%)
- Good: 16–22 marks (53–73%)
- Excellent: 23–30 marks (77–100%).

#### *Section-C*

This section consists of structured nurses performance observational checklist for practice assessment on nebulization therapy in children. It is consisted of 25 questions.

The level of practice will be identified through following scoring criteria.

Each correct response scores 1 mark and wrong response 0 mark.

- Maximum score – 25
- Minimum score – 0.

#### Criteria

- Below average: 0–8 marks (0–23%)
- Average: 9–15 marks (24–50%)
- Good: 16–21 marks (53–73%)
- Excellent: 22–25 marks (77–100%).

#### Reliability

Reliability of research instrument is defined as the extent to which the instrument yields the same results on repeated measures. It is then concerned with consistency, accuracy, precision, stability, equivalence, and homogeneity. The structured student nurses performance observational checklist questionnaires and intervention tools were tested for reliability. The unstructured knowledge questionnaires and intervention a tool was conducted in hospital. The reliability of tool was

established by testing the internal consistency. The internal consistency was assessed using split half technique. Reliability of research instrument is defined as the extent to which the instrument yields the same results on repeat measures. It is then concerned with consistency, accuracy, precision, stability, equivalence, and homogeneity. The questionnaires and intervention tools were tested for reliability.

## Pilot study

Pilot study is a small scale version or trial run done in preparation for a major study. A pilot study is carried out at the end of the planning phase of research, to explore and test the research elements.

The pilot study was conducted in the month of January for 1 weeks. The total sample size for the pilot study was 6. The study was conducted after obtaining permission from the concerned authority and also got permission. It was conducted in a similar way as the final data collection. There were no modifications made in the tool after the pilot study. The tool was found to be reliable. The unstructured knowledge questionnaires and interventional tool was conducted in hospital. The reliability of tool was it was found to be r = 0.78, which indicate that the tool is reliable.

## Data collection procedure

- The investigator self-introduced to the student nurse and also child and the family, and also explains the purpose of conducting the study
- A good rapport will be created with the nurses student, child and the family, and then get the consent
- The demographic variables will be collected with the help of interview questionnaire
- Pre-test assessment of manifested nebulization procedure will be done using the student nurses performance observational checklist in the experimental group, and unstructured knowledge-based questionnaire on nebulization therapy in children
- Before introducing nebulization procedure, the investigator explains about nebulization therapy to the student nurses of the experimental group
- The child is encouraged and giving comfortable position and calm environment to children. and also motivate to student nurses for doing procedure in children
- On the 1st day, the pre-test will be conducted at the end of the 5th post-test day using the student nurses performance observational checklist to identify the improve the practice and knowledge on nebulization therapy
- The duration of data collection was 1 month.

## Section I

Distribution of subject according to socio demographic variables. As per the Table 1

## Section II: Assess the pre-test and post-test knowledge and practice of student nurses regarding nebulization

Depict that, analysis of pre-test practice scores on the basis of scoring criteria 0 (0%) had excellent, 04 (6.6%) had good, average had 46 (76.6%), and poor 10 (16.6%) practice regarding nebulization therapy in children among student nurses Table 2.

**Table 1: Frequency distribution of sociodemographic variables (*n*=60)**

| Sociodemographic variables | Frequency, *n* (%) |
|---|---|
| Age (years) | |
| 18–23 | 1 (1.66) |
| 24–29 | 11 (18.30) |
| 30–35 | 36 (60) |
| >35 | 12 (20) |
| Sex | |
| Male | 22 (36.6) |
| Female | 38 (63.33) |
| Area of residence | |
| Urban | 60 (100) |
| Rural | 0 |
| Semiurban | 0 |
| Type of family | |
| Nuclear | 22 (38.3) |
| Joint | 9 (48.33) |
| Extended | 3 (13.33) |
| Education | |
| BSC nursing | 40 (66.6) |
| MSC nursing | 10 (16.6) |
| Post basic nursing | 0 |
| GNM nursing | 10 (16.6) |
| Religion | |
| Hindu | 57 (93.33) |
| Muslim | 2 (33.33) |
| Sikh | 0 |
| Christian | 1 (1.66) |
| Number of hospitalization with in the past 1 year | |
| 1 time | 15 (25) |
| 2 time | 17 (28.33) |
| 3 time | 18 (30) |
| >3 time | 6 (10) |
| None | 4 (6.6) |
| Previous knowledge of nebulization | |
| Yes | 38 (63.33) |
| No | 22 (36.66) |
| Reason for past hospitalization | |
| BSC nursing | 40 (66.6) |
| MSC nursing | 10 (16.6) |
| Post basic nursing | 0 |
| GNM nursing | 10 (16.6) |
| Source of information | |
| Television | 10 (16.66) |
| Newspaper | 12 (20) |
| Journals | 0 |
| Books | 38 (63.33) |
| Immunization status | |
| Up to date | 10 (16.66) |
| Postdated | 12 (20) |
| Irregular | 38 (63.33) |
| Delayed due to illness | 0 |
| Weight of the child | |
| Below normal | 60 (100) |
| Normal | 0 |
| Above normal | 0 |
| Previous episode of respiratory infection | |
| 1st episode | 41 (68.33) |
| 2–3 episode | 2 (3.33) |
| Episodes | 17 (28.33) |
| >5 episodes | 0 |
| Child exposure to passive smoking at home | |
| Exposed | 46 (76.66) |
| Not exposed | 14 (23.33) |

**Table 2(I): Frequency and percentage distribution of pre-test and post-test knowledge score regarding nebulization (*n*=60)**

| Scoring criteria | Pre-test | | | Post-test | | |
|---|---|---|---|---|---|---|
| | Frequency, *n* (%) | Mean | Mean % | Frequency, *n* (%) | Mean | Mean % |
| Excellent | 0 | | | 4 (6.67) | | |
| Good | 4 (6.6) | 9.75 | 1.66 | 56 (93.33) | 14.51 | 2 |
| Average | 46 (76.6) | | | 0 | | |
| Poor | 10 (16.6) | | | 0 | | |
| Total | 60 (100) | | | 60 (100) | | |

**Table 2(II): Frequency and percentage distribution of pre-test and post-test practice score regarding nebulization (*n*=60)**

| Scoring criteria | Pre-test | | | Post-test | | |
|---|---|---|---|---|---|---|
| | Frequency, *n* (%) | Mean | Mean % | Frequency, *n* (%) | Mean % | Mean |
| Excellent | 10 (16.6) | | | 36 (60) | | |
| Good | 4 (6.6) | 13.08 | 5 | 24 (40) | 17.08 | 7 |
| Average | 46 (76.6) | | | 0 | | |
| Poor | 0 | | | 0 | | |
| Total | 60 (100) | | | 60 (100) | | |

**Table 3(I): Analysis of knowledge score to find out the effectiveness of structured teaching program regarding nebulization therapy (*n*=60)**

| Knowledge score | Mean | Mean±SD | SE | Df | *t* |
|---|---|---|---|---|---|
| Pre-test | 9.75 | 1.66±2.71 | 0.41 | 59 | 6.85 |
| Post-test | 14.51 | 2±1.76 | | | |

SD: Standard deviation, SE: Standard error

**Table 3(II): Analysis of practice score to find out the effectiveness of structured teaching program regarding nebulization therapy (*n*=60)**

| Practice score | Mean | Mean±SD | SE | Df | *t* |
|---|---|---|---|---|---|
| Pre-test | 13.08 | 54.5±2.37 | 0.35 | 59 | 11.42 |
| Post-test | 17.08 | 71.16±1.42 | | | |

SD: Standard deviation, SE: Standard error

Analysis of post-test practice scores on the basis of scoring criteria 4 (6.67%) had excellent and 56 (93.3%) had good practice regarding nebulization therapy in children among student nurses.

Hence, it is concluded, that in the pre-test, maximum of student nurses had average, and practice and, in post-test, maximum student nurses had good practice.

### Section III: Comparison the effectiveness of structured teaching program on knowledge and practice regarding nebulization therapy among student nurses

Table shows that analysis of pre-test and post-test knowledge score to find out the effectiveness of structured teaching program regarding nebulization therapy in children among student nurses, pre-test mean score was 9.75, mean percentage score was 1.66%, and SD was 2.71, analysis of post-test knowledge mean score was 14.51, mean percentage 2% and SD was1.76, and standard error was 0.412, paired "*t*" value was 6.85 that was found to significant at 0.05 level Table 3-I.

The data Shows that of pre-test and post-test level of practice score, the pre-test mean score was 13.08, mean percentage score was 54.5% and SD was 2.37, and the post-test of practice mean score was 17.08 , mean percentage was 71.16%and SD 1.42 and standard error 0.35 , paired "t" value was 11.42 that was found to signficant at 0.05 level. mean score was 17.08, mean percentage 71.16 and SD was1.42, and standard error was 0.35, paired "t" value was 11.42 that was found to significant at 0.05 level Table 3- II.

Hypothesis 1 – In this condition, mean post-test knowledge score is more than mean pre-test knowledge score regarding nebulization therapy in children. Hence, research hypothesis $H_1$ is accepted.

### Section IV: To find out the association between pre-test knowledge and practice level regarding nebulization therapy among student nurses

Data given in show that computed Chi-square values between video-assisted teaching program with selected demographic variables, that is, age, sex, area of residence, type of the family, education, religion, number of hospitalization, previous knowledge, reason for past hospitalization, source of information, immunization status, weight of the child, previous episode of respiratory infection, and child exposure to passive smoking at home, there are no significant, thus accepted the null hypothesis and rejected the research hypothesis.

## Discussion

Nebulizers have been used for many years in acute and chronic management of airflow obstruction in adults and children.[1] Drug deposition in lungs with nebulizer is around 10%, compared to 20–30% with handheld inhalers.[2,5] Despite this difference, studies have concluded that all devices have similar efficacies,[3,4] when used appropriately. Nebulizers require minimal coordination and patient effort during

inhalation,[3,6] an important aspect in patient satisfaction.[7] Although nebulization is prescribed by the clinician, paramedics play a critical role in administering treatment to the patient. We conducted a county-wide survey with paramedics (from nursing homes, hospitals, and clinics) to assess the current nebulizer practices. A 15-item questionnaire in English and Hindi on instructions provided by clinicians, administration of the nebulized drugs, and maintenance of the nebulizer was administered to 100 paramedics (62% females, mean practice 5.89 ± 5.77 years, and mean age 29.68 ± 8.58 years). Fifty-three percentages administered nebulization to more than ten patients a week. Nebulization time was 5–8 min by 36% paramedics, more than 10 min by 28% and 32% reported time to be dependent on drug volume in the medication chamber. It has been observed that longer nebulization time causes inconvenience resulting in reduced patient compliance.[7] Nebulized drugs can be delivered through either face mask or mouthpiece.[8] Nasal inhalation can filter drug particles, reducing bronchodilator response to nearly half which further reduces lung deposition; inhaling through the mouth, especially with the facemask, is therefore important.[5-7,9,10] In the survey, 46% paramedics provided facemask to all patients requiring nebulization. Sixty-seven percentages clinicians instructed on drug and dosage followed by cleaning (50%), nebulization frequency (43%), selection of facemask/mouthpiece (38%), and nebulization time (31%). These parameters are equally important for effective delivery with nebulizers. Inconsistencies in the instructions may affect drug delivery, thus compromising clinical response and treatment outcomes.[11] Our survey reported that cleaning was done after each use by 62% paramedics, 44.68% cleaned only mouthpiece/face mask, and 4.26% cleaned only medication chamber. Disinfectant was used by 39% paramedics whereas 35% used only water for cleaning purposes. To reduce the incidence of nosocomial infections such as pneumonia, measures to prevent transmission of pathogenic microbes[8,12] should be practiced in clinics and hospitals. About 68% paramedics were trained on the use and maintenance of nebulizers, 11% learnt through observation while 21% were untrained. About 34.34% paramedics could not recall attending any training program on handling nebulizers in their practice years. To the best of our knowledge, this is the first ever paramedic survey from India which highlights the nebulizer practices among paramedics across the country. Inconsistencies reported may lead to inadequate drug delivery and predispose patients to infection transmission. Thus, it is imperative to develop and propagate standardized protocols on "good nebulization practices" and conduct training programs for paramedics which can be followed at clinics as well as hospitals.

## Conclusion

After the analysis, the conclusion of this study is more effective for student nurses.

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## Conflicts of Interest

There are no conflicts of interest.

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