

# A Study to Assess the Effectiveness of Nursing Intervention on Respiratory Parameters Among Patients with Acute Respiratory Distress Syndrome in Selected Hospitals at Erode

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## Abstract

**Background:** Acute Respiratory Distress Syndrome (ARDS) is a frequent cause of respiratory failure in critically ill patients, characterized by the sudden development of non-cardiogenic pulmonary edema, low blood oxygen levels, and the requirement for mechanical ventilation. **Objectives:** To determine the Effectiveness of Nursing intervention on Respiratory Parameters among patients with Acute respiratory distress syndrome **Design:** Pre – Experimental design, where one group pre-test and post-test test **design setting:** KMCH Multi specialty Hospital, Erode. **Participants:** 30 patients with acute respiratory distress syndrome patients, who are fulfilling the inclusion criteria, were selected by purposive sampling technique. **Selection criteria:** The inclusion criteria included patients with acute respiratory distress syndrome such as age group 20 to 60 years, both genders. **Methods:** A study was conducted with 30 patients with acute respiratory distress syndrome, received Nursing intervention (Chest Physiotherapy, Hypertonic saline nebulization and prone positioning) Twice a day for 15 days. **Observational tool** was used to assess the respiratory parameters. **Results** pretest mean score was  $(19.52 \pm 1.85)$ , which is 81% whereas in posttest mean score was  $(7.92 \pm 0.09)$ , which is 33%, showing the difference of 48 the paired 't' value was 18.12, when compared to table values (2.05) it was high.

**Keywords:** Chest physiotherapy, hypertonic saline nebulization and prone positioning, ARDS

## INTRODUCTION

Acute Respiratory Distress Syndrome (ARDS) is a prevalent cause of respiratory failure among critically ill patients, characterized by the sudden onset of non-cardiogenic pulmonary edema, hypoxemia, and the necessity for mechanical ventilation. ARDS is commonly associated with conditions such as pneumonia, sepsis, gastric aspiration, or severe trauma and affects approximately 10% of intensive care unit patients globally. Despite some advancements in treatment, the mortality rate remains high, ranging from 30% to 40% in most studies. Pathological examination often shows diffuse alveolar damage, while laboratory research highlights both alveolar epithelial and lung endothelial injury, leading to the accumulation of protein-rich inflammatory fluid in the alveoli. Diagnosis relies on consensus syndromic criteria, with adaptations for resource-limited settings and pediatric cases [1].

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Chest physiotherapy has been employed for various respiratory conditions and is believed to enhance gas exchange, halt pathological progression, and reduce or prevent the need for mechanical ventilation when administered early. However, there is limited evidence regarding its efficacy for COVID-19 patients, particularly during the acute phase, beyond some position papers and recommendations based on anecdotal evidence. This is due to the distinct nature of respiratory issues in COVID-19 patients compared to other respiratory conditions. For example, during the acute phase, COVID-19 patients typically do not experience exudation, and their dyspnea can swiftly escalate to acute respiratory failure. Therefore, prompt mechanical ventilation is strongly advised in these cases [2-6].

### Need for the study

Acute Respiratory Distress Syndrome (ARDS) remains a prevalent and highly debilitating condition despite advances in understanding and managing this complex critical illness. Recent research has highlighted the diversity within ARDS and its likely influence on the effectiveness of therapeutic interventions. While these challenges persist, new data have refined the standard care practices for ARDS, leading to a reassessment of previously established treatments, including ventilation strategies, pharmacologic options, and rescue therapies. As the field of ARDS progresses, there will be a need for innovative strategies to further identify ARDS subtypes and design targeted clinical trials [7-10].

Prone positioning improves gas exchange by redistributing blood to healthier lung regions in addition to enhancing the recruitment and reopening of previously dependent atelectatic areas.

### Objectives

1. To assess the level of Respiratory parameters among patients with Acute Respiratory Distress syndrome before and after nursing intervention
2. To determine the Effectiveness of Nursing intervention on Respiratory Parameters among patients with Acute Respiratory Distress syndrome.
3. To find out the association between the post-test score of respiratory parameters among patients with Acute Respiratory Distress syndrome with their demographic variables.

### VARIABLES

A variable is defined as a concept or abstract notion that can be quantified in measurable terms. In research, it refers to the measurable characteristics, qualities, traits, or attributes of an individual, object, or situation being examined.

### SETTING OF THE STUDY

Research settings are particular locations where data collection takes place. The choice of setting is based on the feasibility of conducting the study, the availability of participants, and obtaining permission from relevant authorities.

### RESEARCH DESIGN

The research design used for the present study was **Pre - experimental design** where **pretest and post test test design** was selected to assess effectiveness of nursing intervention on selected respiratory parameters among patients with **Acute Respiratory distress syndrome**.

### Sample Size

Total number of samples size includes 30 patients with **Acute Respiratory distress syndrome**.

### Section – A

Description of patients according to their Demographic Characteristics.

Distribution of samples according to their age group depicts that, more or less similar percentage (30% and 33%) of the patients were in the age group of 30 -40 and 51 – 60 years. However, 23 % of

patients were 41-50 years of age group and 14% of patients were above 60 years of age group, , most (70%) of the patient were males and only (30%) of patient were female, Distribution of samples according to their duration of illness shows that highest percentage (43%) of patients had 3 – 5 years duration of illness. However, 26 percentages of patients had above 5 years duration of illness. However, more or less (17% and 14%) had less than 1 year and 1 -3 years duration of illness respectively, Distribution of samples according to their history of smoking reveals that half (50%) of them had through 2 to 3 pockets per day, their co morbid condition reveals that most (70%) of them had diabetes mellitus and 30 percentages of them had hypertension (Table 1 & Figure 1) [11-15].

### Section B

Assess the effectiveness of nursing intervention on respiratory parameters among patient with acute respiratory distress syndrome (ARDS).

**Table 1.** Frequency and percentage distribution of samples according to their demographic variables. (n = 30)

| Sl. NO: | Demographic Variables                                              | Frequency (n) | Percentage (%) |
|---------|--------------------------------------------------------------------|---------------|----------------|
| 1       | <b>Age in year</b>                                                 |               |                |
|         | a) 30 – 40 years                                                   | 9             | 30             |
|         | b) 41 – 50 years                                                   | 7             | 23             |
|         | c) 51 – 60 years                                                   | 10            | 33             |
|         | d) Above 60years                                                   | 4             | 14             |
| 2       | <b>Gender</b>                                                      |               |                |
|         | a) Male                                                            | 21            | 70             |
|         | b) Female                                                          | 9             | 30             |
| 3       | <b>Duration of illness</b>                                         |               |                |
|         | a) Less than 1years                                                | 5             | 17             |
|         | b) 1-3years                                                        | 4             | 14             |
|         | c) 3 – 5 years                                                     | 13            | 43             |
|         | d) Above 5 years                                                   | 8             | 26             |
| 4       | <b>Number of previous hospitalizations for respiratory problem</b> |               |                |
|         | a) Nil                                                             | 2             | 7              |
|         | b) 1-3times                                                        | 6             | 20             |
|         | c) 3-6times                                                        | 22            | 73             |
|         | d) More than 6times                                                | -             | -              |
| 5       | <b>Family history of acute respiratory distress syndrome</b>       |               |                |
|         | a. Parents                                                         | 11            | 36             |
|         | b. Siblings                                                        | 4             | 14             |
|         | c. Grandparents                                                    | 15            | 50             |
|         | d. Relatives                                                       | -             | -              |
| 6       | <b>History of smoking</b>                                          |               |                |
|         | a. Do not smoke                                                    | 2             | 7              |
|         | b. ≤ 1pocket/day                                                   | 5             | 17             |
|         | c. 2-3 pockets/day                                                 | 15            | 50             |
|         | d. >3pockets/day                                                   | 8             | 26             |
| 7       | <b>CO-Morbid condition</b>                                         |               |                |
|         | a. Hypertension                                                    | 9             | 30             |
|         | b. Diabetes mellitus                                               | 21            | 70             |

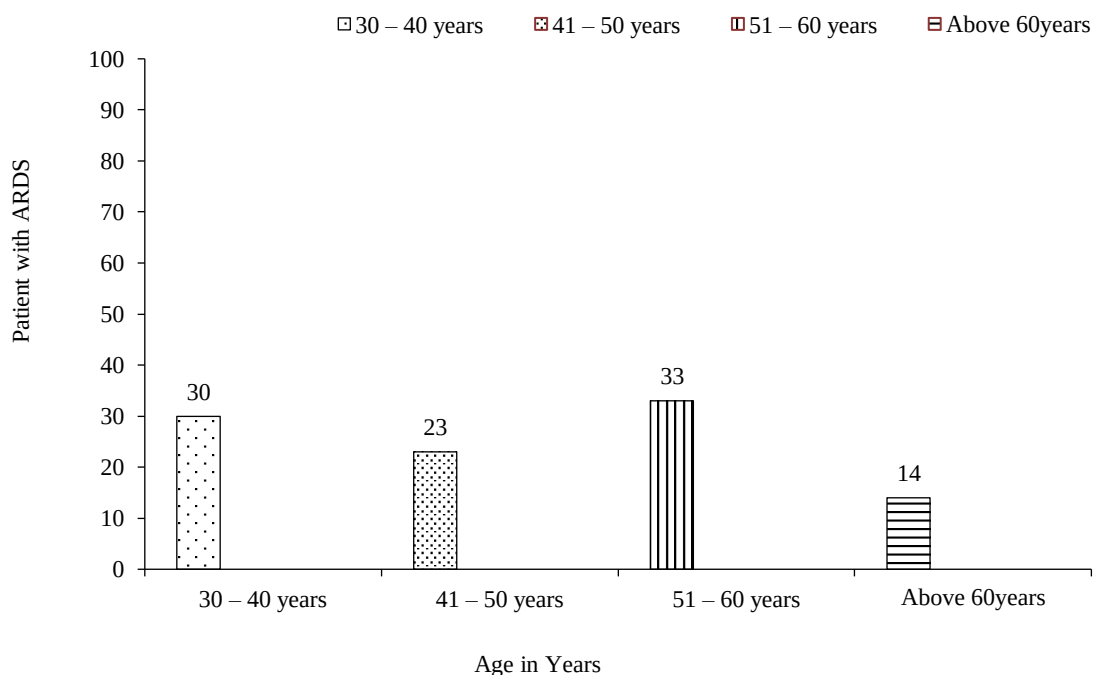
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|----|--------------|---|---|
| c. | Tuberculosis | - | - |
| d. | Others       | - | - |

Paired 't' test was calculated to analyze the difference in pre and post test scores on respiratory parameters (respiratory rate, oxygen saturation, Breath Sounds, Partial Pressure of Oxygen, (PaO<sub>2</sub>), Partial Pressure of Carbon-di-Oxide (PcO<sub>2</sub>) and heart rate). In patients with ARDS the paired 't' value was 18.12, when compared to table values (2.05) it was high (Table 2).

### Section C

Find out the association between the post test scores on respiratory parameters among patients with acute respiratory distress syndrome (ARDS) and their demographic variables.

Chi square was calculated to find out the association between the post test scores of respiratory parameters among patients with acute respiratory distress syndrome (ARDS) and their demographic variables (Age, gender, Duration of illness, Number of previous hospitalizations for respiratory problem, Family history of acute respiratory distress syndrome, history of smoking and Co morbid condition) (Table 3).



**Figure 1.** Bar diagram showing the frequency and percentage distribution of patients with acute respiratory distress syndrome (ARDS) according to their age in years.

**Table 2.** Paired 't' test value of pretest and posttest scores of respiratory parameters among patients with acute respiratory distress syndrome (ARDS)

| Respiratory Parameters                                  | 't' value | Level of significance |
|---------------------------------------------------------|-----------|-----------------------|
| Respiratory rate                                        | 11.02     | p < 0.05 significant  |
| Oxygen saturation                                       | 9.87      | p < 0.05 significant  |
| Breath Sounds                                           | 8.34      | p < 0.05 significant  |
| Partial Pressure of Oxygen (PaO <sub>2</sub> )          | 12.23     | p < 0.05 significant  |
| Partial Pressure of Carbon-di-Oxide (PcO <sub>2</sub> ) | 9.15      | p < 0.05 significant  |

|              |              |                                |
|--------------|--------------|--------------------------------|
| Heart rate   | 10.02        | p < 0.05 significant           |
| <b>Total</b> | <b>18.12</b> | <b>p &lt; 0.05 significant</b> |

*Df -29 Table value - 2.05 (p < 0.05 significant)*

**Table 3.** Association between the demographic variables and the post test scores of respiratory parameters among patient with ARDS.

| Demographic Variables                                       | DF | Chi-square value | TV   | Level of Significance |
|-------------------------------------------------------------|----|------------------|------|-----------------------|
| Age                                                         | 1  | 1.84             | 3.84 | Not significant       |
| Gender                                                      | 1  | 2.01             | 3.84 | Not significant       |
| Duration of illness                                         | 2  | 6.56             | 5.99 | <b>significant</b>    |
| Number of previous hospitalizations for respiratory problem | 1  | 2.56             | 3.84 | Not significant       |
| Family history of acute respiratory distress syndrome       | 2  | 0.63             | 5.99 | Not significant       |
| History of smoking                                          | 2  | 2.84             | 5.99 | Not significant       |
| Co morbid condition                                         | 2  | 3.01             | 5.99 | Not significant       |

*Not significant at p < 0.05.*

## CONCLUSION

The study concluded that nursing intervention on respiratory parameters was highly effective among patients with acute respiratory distress syndrome. The investigator found the overall experience of conducting the study to be a novel encounter in the field of research.

## Nursing Implication

The findings of the study have implication in Nursing service, Nursing administration and Nursing research.

## RECOMMENDATIONS

- The study can be replicated with a large sample size for valid generalization.
- A same study can be conducted with experimental and control group.
- A same study can be conducted with children.

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