RESEARCH PAPER

Enhancing Maternal Competency in Paediatric Nebulization Through Video-Assisted Teaching: A Hospital-Based Study

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ABSTRACT

Introduction: In under-five children, the respiratory disorders contribute as a leading cause for their mortality and morbidity. The nebulization therapy has been an effective method in the treatment of respiratory problems. This study assessed mother's knowledge and practice regarding use of nebulizer among the mothers of under-five children before and after the video-assisted teaching intervention.

Methodology: A pre-experimental one group pre-test and post-test design was used; sixty participants were selected using a simple random sampling technique. Prior to the video-assisted teaching, pre-test was administered that included content related to knowledge and practice on use of nebulizer. It was followed by a post-test on eighth day. A structured questionnaire was used to assess the knowledge of the mothers of under-five children with respiratory disorder and a checklist to assess practices regarding use of nebulizer. The analysis done with frequency and percentage distribution, effectiveness of the video-assisted teaching by computation of mean, standard deviation, and paired t-test and the association of pre-test knowledge scores and practice scores with the demographic variables was tested with the chi square test.

Result: The results showed that the total of 63.3% mothers had average knowledge, 46.7% mothers had average practices before video-assisted teaching. There was a significant improvement in the knowledge and practice scores of participants after the intervention of video-assisted teaching. The mean of pre-test knowledge score was 10.02+2.80 and post-test knowledge score was 19.89+2.20; the t-value was 30.399 and p-value was 0.001. The mean of pre-test practice score was 9.83+3.42 and post-test practice score was 18.40+1.61; the t-value was 18.677 and p-value was 0.001. Thus, showed a significant difference between knowledge and practices regarding use of nebulizer among mothers of under-five children with respiratory disorders as calculated by paired t-test (p-value<0.05). There was no significant association between with pre-interventional knowledge and practice regarding use nebulizer among the mothers and socio demographic variables at 0.05 level of significance; the hypothesis for knowledge being accepted for all variables except prior information regarding use of nebulizer and frequency of use of nebulizer and for practices except for age of mother, occupation, and information regarding use of nebulizer.

Conclusion: Findings concluded an improvement in knowledge and practices of mothers of under-five children regarding use of nebulizer after the implementation of video-assisted teaching.

Keywords: Video-assisted teaching, patient teaching, knowledge, practice, nebulizer, mother's knowledge

How to cite this article: Jathar S, Karane SV, Karadkar G. Enhancing Maternal Competency in Paediatric Nebulization Through Video-Assisted Teaching: A Hospital-Based Study. Int J Drug Deliv Technol. 2026;16(19s): 911-918. DOI: 10.25258/ijddt.16.19s.107

Source of support: Nil.

Conflict of interest: None

1. Introduction

The respiratory disease causes an immense health burden. Respiratory disorders form one of the prime causes of morbidity and mortality among children below five years of age across the world. The worldwide statistics portray mortality figures around 6.6 million among the children below five years of age; the majority of them (95%) found to be in low-income countries. Of the total deaths on-third are attributed to acute respiratory infections (ARI).[1] In India too these ARIs form the major cause of death among children less than 5 years.[2] The contributing factors for a high incidence of ARI include emerging of newer pathogens, re-emergence of those diseases that were earlier controlled, widespread resistance towards antibiotics, and sub-optimal coverage of the children that are immunized in spite of newer and continuous efforts.[2]

Nebulization therapy has been an effective method in the treatment of respiratory problems. The aim of the therapy being to administer the drug through inhalation of the drug in the form of aerosols in a therapeutic dosage. The nebulizers generate aerosols either with a solution or suspensions, that can be delivered via nose, or an artificial airway or mouth in the airways and lungs. Frequently, nebulization therapy can be given as an adjuvant that will be supplementing to the systemic therapy. This therapy requires a comparatively low patient co-ordination and assists in administration of high-dose medications in combination, either intermittently or continuously, with the supplemental oxygen thus, making it a versatile and practical solution for both pre-hospital and in-hospital emergency care.[3]

If nebulizer is used correctly by following dos and don'ts and pre and post care of devices, it helps to reduce the symptoms and provide relief. Numerous studies have focused on nebulization therapy to compare the effects of medications. However, comparatively less is explored on the demonstrations or technique-related aspects with an aim to educate the immediate care takers of the under-five children.[3,4] So, this study was aimed at educating parents with a help of researcher-developed video-assisted intervention on knowledge and practical skill of the use of nebulization therapy. The focus was on assessing effectiveness of this video-assisted teaching on mothers of under five children who received the intervention with the help of pre-intervention and post-intervention observations, compare the findings and finding association between pre-interventional knowledge and practices with selected socio-demographic variables.

The hypotheses that were statistically tested were - H_{01}: - There is no significant difference between knowledge and practices regarding use of nebulizer among the mothers of under-five children with respiratory disorders before and after video-assisted teaching at 0.05 level of significance. H_{02}: - There is no significant association between pre-interventional knowledge and practices regarding use of nebulizer among the mothers of under-five children with respiratory disorders at 0.05 level of significance.

2. Materials and Methods

Study Design: A quantitative research approach and randomized trial design was employed to evaluate the impact of the video-assisted teaching intervention on knowledge and practice regarding use of nebulizer among the mothers of under five children with respiratory disorders was used.

Study participants and procedures: Mothers of the children admitted in the hospital who were on nebulization therapy, understood Hindi, English or Marathi language were eligible as participants. The exclusion criteria being the mothers who were either health professionals or their children were admitted in Paediatric Intensive Care Unit or those mothers who are mentally unstable.

The data was collected from a total sample of 60 mothers of under-five children diagnosed with respiratory disorder and needed nebulization therapy as a part of the treatment after an informed consent. The sample was selected using a probability random sampling method to ensure an unbiased representation of the population. The sample size was determined by the formula McNemar's approximation.

The participants that fulfilled the inclusion criteria were randomly assigned in the study. The data collection included data related to demographics, medical information of the participants; their knowledge and practices regarding use of nebulizer. The knowledge questionnaire comprised of 21 multiple choice questions. The practice of mothers on use of the nebulizers was assessed by a checklist; that consisted of 22 steps. The tools for data collection and video were validated from experts. The questionnaire and checklist were tested for reliability. The tools were found to be reliable with a reliability value was 0.828 for knowledge questionnaire and 0.841 for the checklist.

Intervention: The mothers were included as a sample of the study as per the inclusion criteria. They were selected by random sampling, and they were provided with the pre-test and then exposed to the video-assisted teaching intervention regarding knowledge and practice on use of nebulizer. The video included demonstration of nebulizer with the help of audio-visual aids such as charts and power point presentation. The researcher included a live commentary on the explanation of the steps of the procedure of the use of nebulizer. It was detailed as per the responsivities and technique that as per pre-procedure, during procedure and post procedure. The commentary was available in three languages i.e. in English, marathi and hindi. The trained nurse researcher provided the demonstration; a pre-test was conducted using the knowledge questionnaire and practice checklist. The participants were provided video assisting teaching on the same day. A post-test was conducted on eighth day of the intervention.

Statistical Analyses: The computation of the data analysis was done using descriptive and inferential statistics. Participant demographics and medical

characteristics were described using frequency and percentage. The comparative statistical analysis was done using paired t-test and chi square test. In tests of significance, p- value less than 0.05 was used. IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, version 23.0 was used in the analyses.

Results: A total of 60 participants were included in the study. The results are described in sections of frequency and percentage distribution of demographic data followed by the knowledge and practice levels of the participants. The analysis also includes pre-test and post-test scores assessed before and after the intervention depicting the knowledge and practice among the mothers of under-five children.

As per Table 1, regarding the demographic variables; out of the total participants, maximum (30 i.e. 50%) were in the age group of 26-30 years of age. The distribution of mothers according to the age of their children, 5 (8.3%) were having 1 year child, 17 (28.3%) were having 2-year child, 6 (10%) were having 3-year child, 20 (33.3%) were having child of 4 years and 12 (20%) were having 5-year child. Regarding education, maximum participants i.e. 21 (35%) had completed primary schooling followed by 17 (28.3%) had completed secondary schooling education. 47(78.3%) belonged to nuclear family; and 51 (85%) were home makers; 27 (45%) had monthly family income ranging between Rs. 10,000/- to Rs. 20,000/-. Only 14 (23.3%) mothers had some information regarding use of nebulizer and those who had the information had received it from either doctor or the nurse.

Table 1: Distribution of demographic data according to frequency and percentage n = 60

Demographic variable	Category	f	%
Age of mothers (in years)	20-25 years	22	36.7
	26-30 years	30	50.0
	31-35 years	8	13.3
Age of children (In Years)	1 years	5	8.3
	2 years	17	28.3
	3 years	6	10.0
	4 years	20	33.3
	5 years	12	20.0
Education of mothers	Primary School	21	35.0
	Secondary school	13	21.7
	Higher secondary school	17	28.3
	Intermediate/ Diploma	2	3.3
	Graduate	7	11.7
Type of family	Joint	13	21.7
	Nuclear	47	78.3
Occupation of mothers	House maker	51	85.0
	Private job	9	15.0
	Government job	0	0
	Self-employed / Business	0	0
Monthly family income	Less than 10,000	0	0
	10,001-20,000	27	45.0
	20,001-30,000	26	43.3
	30,001 and above	7	11.7
Information on use of nebulizer	Yes	14	23.3
	No	46	77.7

Regarding medical characteristics, the children receiving nebulization were diagnosed with ARTI 40 (66.7%), bronchitis 9 (15%), pneumonia 5(8.3%) and were sick due to either of the condition for a varying duration of less than 3 days up to maximum 15 days. Regarding frequency of use of nebulizer, 5(8.3%) were using nebulisation once a day, 15(25%) were using twice a day, 24(40%) were using thrice a day and 4(26.75%) uses as per doctor's advice.41(68.3%) mothers reported that their child was receiving nebulisation for the second time whereas 4(6.7%) had their child receiving nebulisation for the first time.

Table 2: Distribution of medical characteristics according to frequency and percentage

n = 60

Variable	Category	f	%
Diagnosis	ARTI	40	66.7
	Bronchitis	9	15
	Pneumonia	5	8.3
	Asthma	1	1.7
	Any other	5	8.3
Duration of illness	1 to 3 days	4	6.7
	4 to 7 days	38	63.3
	8 to 15 days	18	30
	First time	4	6.7
	Second time	41	68.3

Number of times receiving nebulization	Three or More time	15	25.0
Frequency of use of nebulizer	once in a day	5	8.3
	twice in a day	15	25
	thrice in a day	24	40
	As and when advised as required	4	26.7

The pre- interventional knowledge regarding use of nebulizer among mothers of under-five children with respiratory disorders i.e., before video-assisted teaching as presented in table 3 shows that majority 38(63.3%) had average knowledge level, 7(11.7%) had poor knowledge level, 15(25%) had good knowledge level and none of the mothers had excellent knowledge level.

Table 3 Pre-intervention knowledge scores regarding use of nebulizer among participants

n = 60

Knowledge level	Score category	GROUP Intervention	
		Frequency	Percentage
Poor	1-6 (0-25%)	7	11.7
Average	7-12 (26-50%)	38	63.3
Good	13-18 (51-75%)	15	25.0
Very good	19-24 (76-100%)	0	0
Total		**60**	**100**

The pre-intervention practice regarding use of nebulizer among mothers of under five children with respiratory disorders i.e., before video-assisted teaching as depicted in table 4, majority 28(46.7%) had average practice level, 15(25%) had poor practice level, 17(28.3%) had good practice level and none of the sample had excellent practice level.

Table 4 Pre-intervention practice scores regarding use of nebulizer among participants n = 60

Practice level	Score category	Frequency	Percentage
Poor	0-6 (0-25%)	15	25.0
Average	7-11 (26-50%)	28	46.7
Good	12-17 (51-75%)	17	28.3
Very good	18-22 (76-100%)	0	0
Total		**60**	**100**

Figure 1 presents the pre-intervention and post-intervention knowledge level, the pre-intervention scores depict majority 38(63.3%) had average knowledge level, 7(11.7%) had poor knowledge level, 15(25%) had good knowledge level and none of the mothers had excellent knowledge level. Whereas, post- intervention, majority 44(73.3%) had excellent knowledge level, 16(26.7%) had good knowledge level and none of the mothers remain having average or poor knowledge level.

Figure 1 Distribution of pre-intervention and post-intervention knowledge score before and after video-assisted teaching among mothers of under five children n = 60

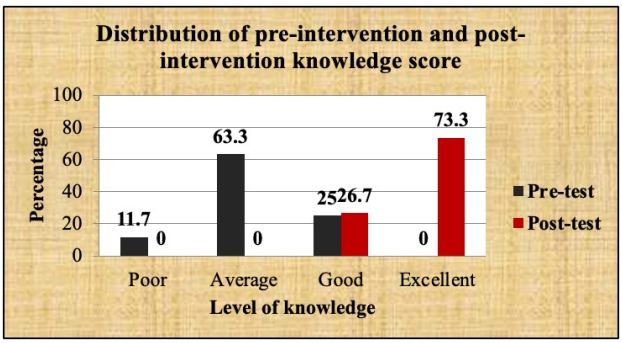
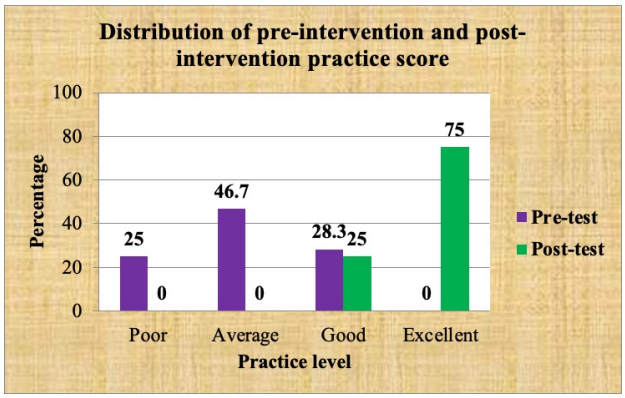


Figure 2 presents the pre-intervention and post-intervention practice level, the pre-intervention scores depict majority 28 (46.7%) had average practice level, 15(25%) had poor practice level, 17(28.3%) had good practice level and none of the sample had excellent practice level. Whereas, in post-test majority, 45(75%) had excellent practice level, 15(25%) had good practice level and none of the sample remain having average or poor practice level.

Figure 2 Distribution of pre-intervention and post-intervention knowledge score before and after video-assisted teaching among mothers of under five children n = 60



The comparison of mean knowledge score before and after intervention, in pre-test the mean knowledge score is 10.02±2.80 which is lesser than the mean knowledge score in post-test 19.89±2.20, the mean difference was 9.87. The calculated t value was 30.399 with degree of freedom 59 at 0.05 level of significance. The calculated p value 0.001 is lesser than 0.05, hence we conclude that there is significant difference between the pre and post intervention knowledge score of mothers regarding use of nebulization among mothers of under-five children with respiratory disorders. Thus, **$H0_1$** i.e., there was significant difference between knowledge regarding use of nebulizer among the mothers of under-five children with respiratory disorders before and after video-assisted teaching at 0.05 level of significance was rejected.

Table 5 Comparison of video assisted teaching on knowledge regarding use of nebulization among mothers of under-five children with respiratory disorders (Paired t-test)

n=60

Knowledge score	Mean	SD	Mean difference	df	t value	p value	Significance
Pre-intervention	10.02	2.80	9.87	59	30.399	0.001	Significant
Post-intervention	19.89	2.20					

The table below shows that the comparison of mean practice score before and after intervention, in pre-test the mean practice score is 9.83±3.42 which is lesser than the mean practice score in post-test 18.40±1.61, the mean difference was 8.57. The calculated t value was 18.677 with degree of freedom 59 at 0.05 level of significance. The calculated p value 0.001 is lesser than 0.05, hence we conclude that there is significant difference between the pre and post intervention practice score of mothers regarding use of nebulization among mothers of under-five children with respiratory disorders. **Thus, $H0_2$** was rejected; that there was significant difference between practice regarding use of nebulizer among the mothers of under-five children with respiratory disorders before and after video-assisted teaching at 0.05 level of significance.

Table 6 Effect of video assisted teaching on practice regarding use of nebulization among mothers of under-five children with respiratory disorders (Paired t-test)

Practice score	Mean	SD	Mean difference	df	t value	p value	Significance
Pre-Test	9.83	3.42	8.57	59	18.677	0.001	Significant
Post-test	18.40	1.61					

The association between pre-interventional knowledge and practices was tested with chi square test. The demographic variable of **"Information regarding use of nebulizer" and "frequency of use of nebulizer"** had significant association as the p value is less than 0.05. Whereas, for the rest of the variables it was found to have no significant association. Thus, **$H0_3$** was rejected for the demographical variable education and Information regarding use of nebulizer and frequency of use of nebulizer.

Table 7 Association between pre-interventional knowledge regarding use of nebulization among mothers of under-five children with selected demographic variables

Sr. No	Variables	Chi square value	Df	P value	Decision for p value
1	Age of mother	1.005	4	0.909	Non-significant
2	Age of children	2.171	8	0.975	Non-significant
3	Education	4.055	8	0.852	Non-significant
4	Type of family	0.340	2	0.844	Non-significant
5	Occupation	1.617	2	0.446	Non-significant
6	Monthly family income in rupees	3.788	4	0.435	Non-significant
7	Received information regarding use of nebulizer	6.094	2	0.047	**Significant**
8	Source of information	0.875	2	0.646	Non-significant
9	Receiving nebulization for	1.531	4	0.821	Non-significant
10	Diagnosis	2.673	6	0.849	Non-significant
11	Duration of illness	0.901	4	0.924	Non-significant
12	Medication solution used for nebulization	. No statistics are computed because this variable is a constant.			
13	Frequency of use of nebulizer	17.838	6	0.007	**Significant**

The table 8 shows that chi square value for the demographic variable of **"Age of mother" "Occupation" "Monthly family income in rupees**" **and information regarding use of nebulizer"** has significant association as the p value is less than 0.05. Whereas, for the rest of the variables it was found to have no significant association. Thus, null hypothesis **$H0_4$** was rejected for the demographic variable of Age of mother, Occupation, Monthly family income in rupees and information regarding use of nebulizer.

4. DISCUSSION

Video assisted teaching has been proven to enhance not only cognitive ability but also skills. [7] It also has an added advantage for improving comprehension with regards to health-related information, therapies and thus improves compliance towards the treatment. Use of admixture of audio and video enhances comprehension. In this research study, the researchers developed a video to educate the mothers of under five children with respiratory disorders about proper use of nebulizers. The participants demonstrated a significant improvement in knowledge and practice regarding the use of nebulizers for the children. This was evidenced by improvement in knowledge and practice scores post - intervention. A comparison of the mean scores also showed a significant difference as found by paired t-test values and p-value less than 0.05 thus, rejecting the null hypotheses. The findings were relatable to studies that have focused on similar strategies to have improved learning outcomes among mothers of under five children.

A descriptive study by Shaker M.H., Mahmoud F.S., Said K.M. to assess knowledge of the mothers and their practice of inhalation therapy advised for their children diagnosed with croup from inpatient and outpatient units affiliated to Benha University Hospital and Benha Specialized Pediatric Hospital. The sample size was 100 mothers selected via convenient sampling and data collection was done with the help of Arabic Structured Interviewing Questionnaire and observational checklist to assess mother's reported practice regarding inhalation therapy, physiotherapy and care of fever. 58 percent of the mothers had low levels of whereas only 18 percent had a

good level of knowledge. Seventy-five percent had unsatisfactory level of practice about croup and inhalation therapy. The inadequate knowledge and practice of mothers was found to be affected by the variables of rural residence, low educational level of mother, below 30 years of age and those more than 40 years of age, occupational status of being home makers and those not attended training courses. [5]

Welch M.J. , Williams P.V., Martin M.L conducted research on comparison of mastery of nebulization therapy versus metered-dose inhaler (MDI) with spacer with/without mask in caregivers of young children with asthma. At the point of a first-time prescription of either a nebulizer or an MDI/spacer with/without face mask, caregivers were taught a standardized set of steps for proper use. A week later, they returned to demonstrate the steps, and errors were noted. Of the 156 caregivers that were enrolled, 28% where parents of children were prescribed a nebulizer; 72% where parents of children prescribed an MDI/spacer. Age of parent, level of formal education, and previous personal experience with asthma were similar between the two groups. Caregivers demonstrated a 7.7% major error rate for the nebulizer, and a 12.9% major error rate for the MDI/spacer. The breakdown of major error types for nebulizer versus MDI/spacer, respectively, was device preparation - 2.2% vs 9.7%; actual use - 21% vs 15.5%; cleaning - 0% vs 12.9%. A sizeable number of major errors in the use of the two inhaled delivery systems are made by caregivers of young children with asthma despite the thoroughness of initial training. Use of the MDI/spacer takes less time than a nebulizer, but it comes with a higher error rate.[6]

It can be discussed that having a mastery on appropriate use of nebuliser technique, it aids in better control of the clinical symptoms in the affected children. The description about the use of the nebulizer in the local languages made it more comprehensible for the mothers' understanding. The practical tips provided in the video regarding the use and personal interactions by the researchers with the mothers helped in better engagement of the participants and a good co-operation from them. It was reflected in the improvement of post intervention practice scores as assessed by a checklist.

5. Conclusion

The findings of the study demonstrated a notable improvement in both knowledge and practice regarding the use of nebulizers by the mothers of under-five children after the intervention. Thus, the intervention was found to be of practical help for thorough comprehension of the nebulizer usage for their children. The study portrayed a positive impact of the video-assisted teaching regarding the knowledge and practice of nebulizers as evidenced by the statistically significant differences between the pre- and post-intervention test scores of the sample. Thus, it can be concluded that health teaching is complemented when both audio and visuals are utilized for imparting the health education.

This study examined the impact of video-assisted teaching of the skill of using nebulizer that was developed by a nurse; this can reduce the errors in its usage and enhance better treatment outcomes. The findings suggest potential for cost- effective use of the newer technologies, especially when there is easy availability of mobile-based technology to all people globally. The study highlights the need for nurses to implement interactive methods to enhance patient wellbeing.

6. CONFLICT OF INTEREST: The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.

7. FUNDING SOURCE There is no funding source for this study.

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