



“Effectiveness of Spacer in delivering salbutamol drugs in to the lungs for asthmatic children among mothers of Children at Tertiary care Hospital, Chennai – 08.”

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Abstract

Back ground of the study: Spacer is a device; it plays an effective role in delivering aerosol drugs in to the lungs for asthmatic children than other inhalation techniques. Inappropriate inhalation technique is hazardous to the safety of children with asthma and unnecessarily increases costs resulting from unnecessary re-hospitalization. Most of asthmatic children being treated with inhaler medication do not use such devices appropriately, a close care giver, the mothers can be educated to use spacer techniques correctly. Since there is very need to educate mothers of asthmatic children on spacer techniques.

Objective of the Study: To assess the level of knowledge and practice about spacer techniques in administering salbutamol among mothers of children with bronchial asthma.

The present study was conducted to “Assess the knowledge and practice regarding effectiveness of spacer techniques in administering salbutamol for bronchial asthma among mothers of children at Pediatric Medical OPD, Institute of Child Health and Hospital for Children, Chennai. **Methods:** It is a quantitative approach, pre experimental one group pretest and post - test study design, selected mothers (60) of asthmatic children (1-9 Years), were trained by demonstration of spacer technique using purposive sampling technique. The pretest, knowledge and practice level was assessed about the bronchial asthma and spacer by structured questionnaire. Then a spacer technique was demonstrated (Standardized check list). On 7th day post - test knowledge and practice was assessed. Data collection was done from 07-09-2021 to 07-10-2021. Formal written permission from hospital authorities was obtained prior to data collection process. Data was collected using a structured interview schedule. Data was analyzed using descriptive and inferential statistics.

Results: In post - test the existed knowledge and practice level of mother and respiratory status of children was assessed. Mean, standard deviation, t-test; Karl Pearson chi-square test is used for statistical analysis. The study showed there is a significance in between pretest and post - test level of Knowledge from 40.7% to 84.8%; % of gain ↑44.1%, and Practice level from 32.2% posttest to 84.0%; % of gain ↑51.8%. (Pretest $r=0.18$ $P=0.13$ Not significant, posttest $r=0.66$ $P=0.001$ *** Highly Significant, positive, good correlation between knowledge and

practice. **conclusion:** The study showed there is an association in between knowledge and Practice level and Mother's demographic variables. Elder age, more education and urban mothers are having more knowledge than others. The result shows a well intervention teaching programmes like demonstration of spacer techniques would improve the knowledge and Practice level of mothers in management of asthmatic children. In this study the mothers and their asthmatic children were benefited.

Keywords

Effectiveness; structured teaching programme; spacer techniques.

INTRODUCTION

Asthma is one of the world's most common long term diseases. Asthma affects an estimated 78 million children world-wide. Poor compliance with the prescribed medication leads to increased mortality and morbidity. Asthma is a chronic illness that affects 1 in 4 children, and 1 in 7 adults. Effective control of asthma requires a good level of knowledge and self- management. Asthma is a major public health problem in school-aged children. Implementing strategies to reduce the prevalence and severity of asthma symptoms (and the associated avoidable asthma morbidity and mortality and subsequent burden of related diseases, including chronic obstructive pulmonary disease) should be a priority for the 21st century. . More than half (53%) of people with asthma had an asthma attack in 2008. More children (57%) than adults (51%) had an attack. 185 children and 3,262 adults died from asthma. About 1 in 10 children (10%) had asthma and 1 in 12 adults (8%) had asthma in 2009. Women were more likely than men and boys more likely than girls to have asthma. In 2010, 3 out of 5 children who have asthma had one or more asthma attacks in the previous 12 months. This present study consistent with the supported by another study conducted by Dr. S.Shivbalan, S. Balasubramanian et al (2005). Department of Pediatrics, Kanchi Kamakoti Childs Trust Hospital (KKCTH), Chennai, India This descriptive study was conducted to evaluate the knowledge, attitude and practice about the causation, treatment and prognosis of asthma amongst the parents of children with asthma. The author Concludes- General awareness of asthma in the community is poor. Patient education programme should augment awareness, eliminate social stigma and mis concepts in the community regarding asthma. Knowledge about the prevailing perception in the community would be the first step in achieving this. Current literature supports the promises that education is a vital ingredient of self- management. Total burden of asthma in India as 34.3 million, accounting for 13.09% of the global burden.20 Jan 2022.

Need for Study: Asthma may occur at any age, 30% of patients are symptomatic by one year of age, whereas 80 – 90% of asthmatic children have their first symptoms before 4- 5 years of age. In this 0 – 15 % of boys and 7 – 10% of girls may have asthma during childhood period. 5.5 million Children in the United States and leads to 546,000 emergency department (ED) visits and 80,000 hospitalizations annually. Regarding pharmacological therapy it is important that parents understand how the medicines work and how to give the medicines including use of spacers and also the potential harmful effect of drugs while giving systemic. Delivery of drugs as aerosols, particularly via metered dose inhalers, has been a major breakthrough in the treatment of asthma, as it allows adequate drug deposition in the lower respiratory tract without any significant systemic side effects. However, despite adequate tuition many patients are unable to use a pressurized inhaler efficiently, especially children. Inhalation therapy using a pressured metered dose inhaler and a spacer is frequently used in the treatment of

airway disease in children. Inhalation therapy using a pressured metered dose inhaler combined with a spacer plays a crucial role in the treatment of young asthmatic children. As per WHO asthma affected an estimated 262 million people in 2019 (1) and caused 455 000 deaths. Asthma is included in the WHO Global Action Plan for the Prevention and Control of NCDs and the United Nations 2030 Agenda for Sustainable Development. The current asthma prevalence among children increased from 8.7% in 2001 to 9.5% in 2011 and then decreased significantly to 6.5% in 2021. The current asthma prevalence among adults increased from 6.9% in 2001 to 8.0% in 2021. The prevalence of asthma in children <12 years of age and possible differences in prevalence to asthma between urban and rural areas. Tamil Nadu, south India Chakravarthy et al. Specifically this study aims to provide the mothers of asthmatic children, an action plan that will include demonstration and description of asthma management with spacer in simple language, the signs and symptoms, complications, instructions for daily management with Spacer in response to symptoms as well as points to reinforce asthma management skills and minimizing exposure to triggers. For children with frequent acute exacerbations, the teaching plan will tell the parents regarding use of peak flow meter with a symptom diary. In Pediatric medical outpatient department, Institute Of Child Health, nearly 423 asthmatic children were attended outpatient clinic from January to September 2021.

All these factors prompted the investigator into the knowledge domain regarding bronchial asthma in children and motivated to impact the knowledge on bronchial asthma and its management by spacer device to the mothers of asthmatic children.

Statement of the Problem: *“A study to assess the Knowledge and Practice regarding effectiveness of Spacer to administer salbutamol for Bronchial asthma among mothers of children” at Institute of Child Health and Hospital for Children, Chennai.*

Objectives of the Study:

- To assess the level of knowledge and practice about spacer to administer salbutamol for bronchial asthma among mothers of children with bronchial asthma.
- To evaluate the effectiveness of spacer to administer salbutamol for bronchial asthma among mothers of children
- To compare the pretest and post-test knowledge and practice about spacer to administer salbutamol for bronchial asthma among mothers of children.
- To associate the knowledge and practice about spacer to administer salbutamol for bronchial asthma among mothers of children with their selected demographic variables.

Hypotheses:

- **H₁:** There is significant difference between the mean pretest and posttest knowledge & Practice among mothers of asthmatic children.
- **H₂:** There is significant association between the knowledge and Practice level score for mothers of asthmatic children with their selected demographic variables.

Materials and Methods

Research Approach: Quantitative research approach

Research Design: Pre-experimental – one group pretest post - test research design.

Setting: Outpatient Asthma clinic of the institute of child health and Hospital for Children, Chennai -8.

Population: The target population of this study was the mothers of asthmatic children with the age group of more than 21 years.

Sample: Mothers of asthmatic children, who attend the pediatric outpatient department, receiving spacer with salbutamol and who fulfill the inclusion criteria.

Sample Size: 60 mothers of asthmatic children were selected from the asthma clinic outpatient department, Institute of child Health and Hospital for Children, Chennai.

Sampling Technique: Purposive sampling

Development of the Tool: The structured knowledge Questionnaire (30) was used to assess the Knowledge of mothers regarding asthma and Spacer. The knowledge part multiple option questions and modified standardized checklist for Practice all of which were scored, each correct answers was given a score of 'one' and wrong answers a score of 'zero'. The total score was 30.

Scoring Technique: Knowledge: min=0 max=20; Inadequate = 0-10; Moderate = 11 – 15; Adequate = 16 – 20

Practice: - min=0 max=10; Poor = 0 – 4; Moderate = 5 – 7; Good = 8 – 10

Clinical Parameters of Children: *Score* Respiratory Status Assessment

0 – Normal; 1-7 – Mild Distress (35%); 8 – 14 – Moderate Distress (36-70%);

15 – 20 – Severe Distress (71 – 100%).

The Pilot study Conducted the data was collected from the 10 mothers of asthmatic children in outpatient medical department of Institute of child health.

Data collection procedure:

The Structured Questionnaire was used to collect data from 16.08.2021 to 15.09.2021.

Approximately 2 - 4 mothers were interviewed per day and about 20-30minutes were spent with each mother. Demonstration of spacer techniques was done on the same day based on Modified standardized check list (Discuss device technique) clinical parameters of respiratory status (modified rating scale) for the children was assessed. After a period of 7 days, post- test level of knowledge and practice, clinical parameters of the children was assessed within the same group by using the same questionnaire.

Intervention: Demonstration of Spacer - (DISKUS DEVICE TECHNIQUE)

- 1) Keep the child in sitting position
- 2) Shake inhaler 4–6 times Remove cap from inhaler
- 3) Attach inhaler into valve holding chamber (Spacer)
- 4) Instructed child to Exhale normally
- 5) Tilt head back slightly, place holding chamber (spacer) mouthpiece between lips, holding inhaler upright
- 6) Press inhaler canister once to place dose in holding chamber
- 7) Begin a slow deep inhalation immediately after placing dose in holding chamber (3–4 s)
- 8) Instructed child to Hold breath for 10 sec
- 9) Wait at least 30 sec and repeat steps above if using another puff
- 10) Clean the spacer with detergent water

Ethical Consideration

1. Written permission were obtained from Director- Institute of Child Health and Research Institute, Chennai-8.
2. Ethical permission obtained from Chairperson of Ethical committee, Madras Medical College, Chennai-3.
3. Prior informed consent was obtained from Mothers of asthmatic children, who attend the pediatric outpatient department ICH & RI, Chennai-8.

Validity and reliability: The tool was validated by 7 experts, of which 5 were Nursing experts and 2 were Pediatrician, Statistician, English language expert and translated into Tamil by language experts without changing the meaning of the tool. The reliability of the tool was assessed by using Test retest method.

Data analysis: The collected data was analyzed by means of descriptive and inferential statistics.

Major Findings of the Study

- Majority of 47 mothers (78.3%) were in the age group of 21-30
- About the education level majority of the 37 mothers (61.7%) were in Primary education level
- Regarding occupation of mothers, majority of 35 mothers (58.3%) were housewives,
- About the Income majority of 28 mothers (46.7%) were >5000 Rs,
- Regarding type of Family majority of 41 mothers (68.3%) were belongs to Nuclear family
- About the area of living 24 mothers (40.0%) was living in Urban.

Comparison of Pretest and Posttest Knowledge of Mothers n=60

Level of knowledge	Pretest		Posttest		Chi square test
	N	%	N	%	
Inadequate	46	76.7%	0	0.0%	$\chi^2=95.36$ p=0.001*** DF=2 Significant
Moderate	14	23.3%	11	18.3%	
Adequate	0	0.0%	49	81.7%	
Total	60	100%	60	100%	

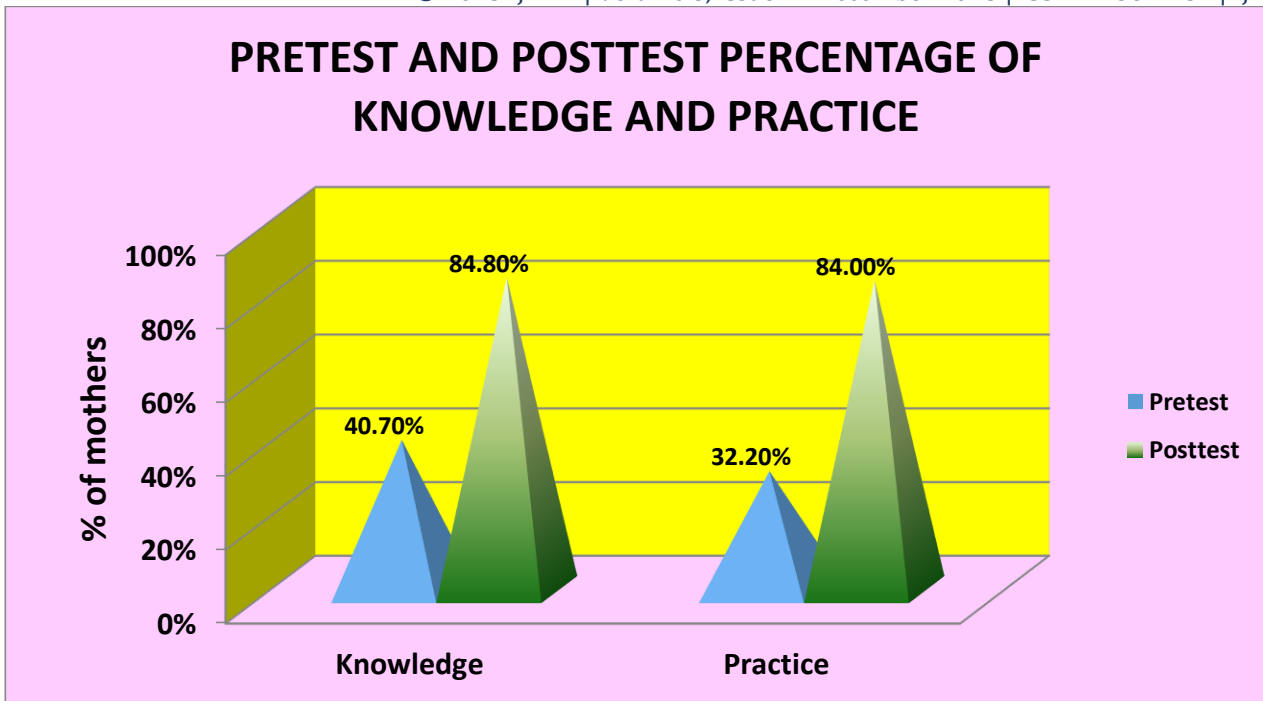
Comparison of Pretest and Posttest Practice of mothers n=60

LEVEL OF PRACTICE	Pretest		Posttest		Chi square test
	N	%	N	%	
Poor	50	83.3%	0	0.0%	$\chi^2=88.10$ p=0.001*** DF=2 Significant
Moderate	10	16.7%	12	20.0%	
Good	0	0.0%	48	80.0%	
Total	60	100%	60	100%	

* Significant at $P \leq 0.05$ ** highly significant at $P \leq 0.01$ *** very high significant at $P \leq 0.001$.

Effectiveness of Demonstration of Spacer to Mothers of Asthmatic Children**n=60**

	PRETEST	POSTTEST	% OF GAIN
KNOWLEDGE	40.7%	84.8%	↑44.1%
PRACTICE	32.2%	84.0%	↑51.8%



Effectiveness of Demonstration of Spacer to Mothers of Asthmatic Children

n=60

	PRETEST	POSTTEST	% OF GAIN
KNOWLEDGE	40.7%	84.8%	↑44.1%
PRACTICE	32.2%	84.0%	↑51.8%

The above table shows the Effectiveness of Demonstration of spacer to mothers of children with bronchial asthma. It shows the percentage of gain score in pretest and posttest knowledge and practice.

The Knowledge score in pretest (40.7%) and post test (84.8%) the percentage of increased gain score is ↑44.1%. The practice score in pretest (32.2%) and post- test (84.0%) the percentage of increased gain score is ↑51.8%.

Comparison of Pretest and Posttest Clinical Parameters of the Children n=60

	pretest		posttest		Student Paired t-test
	Mean	SD	Mean	SD	
Respiratory Rate	35.90	3.02	31.83	3.02	t=16.08 p=0.001*** DF=59
Pulse Rate	117.97	7.28	113.90	7.22	t=1.00 p=0.32 DF=59
Skin temperature	37.12	.31	37.08	.25	t=1.42 p=0.16 DF=59
Cough	1.38	.78	0.32	.54	t=9.18 p=0.001*** DF=59
Breath sounds	1.97	.18	.13	.43	t=31.06 p=0.001*** DF=59
Oxygen saturation %	88.63	1.78	98.30	1.98	t=28.15 p=0.001*** DF=59

*significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

Association between Level of Knowledge Gain and Demographic Variables of Mothers

n=60

Demographic variables		Level of Knowledge gain				Total	Chi square test
		Below average(<9)		Above average(>9)			
		n	%	N	%		
Age	21 -30 yrs	27	57.4%	20	42.6%	47	$\chi^2=4.81$ $p=0.03^*$ DF=1
	31 -40 yrs	3	23.1%	10	76.9%	13	
Education	Non formal education	5	71.4%	2	28.6%	7	$\chi^2=9.62$ $p=0.02^*$ DF=3
	Primary	22	59.4%	15	40.6%	37	
	Hr. Secondary	3	25.0%	9	75.0%	12	
	Collegiate & above	0	0.0%	4	100.0%	4	
Occupation	House wife	19	54.3%	16	45.7%	35	$\chi^2=1.39$ p=0.70 DF=3
	Government. Employed	1	50.0%	1	50.0%	2	
	Private employed	8	40.0%	12	60.0%	20	
	Self employed	2	66.7%	1	33.3%	3	
Income	Rs.2000 – 3000			5	100.0%	5	$\chi^2=7.21$ p=0.07 DF=3
	Rs.3001 -4000	6	60.0%	4	40.0%	10	
	Rs.4001 -5000	7	41.2%	10	58.8%	17	
	>Rs.5000	17	60.7%	11	39.3%	28	
Type of family	Nuclear family	21	51.2%	20	48.8%	41	$\chi^2=0.08$ p=0.78 DF=3
	Joint family	9	47.4%	10	52.6%	19	
Area of living	Rural	12	75.0%	4	25.0%	16	$\chi^2=6.67$ p=0.03* DF=2
	Semi urban	10	50.0%	10	50.0%	20	
	Urban	8	33.3%	16	66.7%	24	
Age	1- 3 years	16	55.2%	13	44.8%	29	$\chi^2=2.04$ p=0.54 DF=3
	3- 5 years	5	41.7%	7	58.3%	12	
	5- 7 years	3	33.3%	6	66.7%	9	
	7- 9 years	6	60.0%	4	40.0%	10	
Sex	Male	18	48.6%	19	51.4%	37	$\chi^2=0.07$ p=0.79 DF=1
	Female	12	52.2%	11	47.8%	23	
Order of birth	First	13	52.0%	12	48.0%	25	$\chi^2=4.40$ p=0.22 DF=3
	Second	11	44.0%	14	56.0%	25	
	Third	6	75.0%	2	25.0%	8	
	Fourth and above			2	100.0%	2	
Education	L.K.G	20	54.1%	17	45.9%	37	$\chi^2=2.04$ p=0.56 DF=3
	U.K.G	1	20.0%	4	80.0%	5	
	I st std to 2nd std	5	50.0%	5	50.0%	10	
	3rd std to 4th std	4	50.0%	4	50.0%	8	

Association between Level of Practice Gain and Demographic Variables of Mothers

n=60

Demographic variables		Level of practice gain				Total	Chi square test	
		Below average(<5)		Above average(>5)				
		N	%	n	%			
Age	21 -30 yrs	28	59.5%	19	40.5%	47	$\chi^2=7.95$ p=0.01** DF=1	
	31 -40 yrs	2	15.3%	11	84.7%			13
Education	Non formal education	5	71.4%	2	28.6%	7	$\chi^2=9.62$ p=0.02* DF=3	
	Primary	22	59.5%	15	40.5%			37
	Hr. Secondary	3	25.0%	9	75.0%			12
	Collegiate & above	0	100.0%	4	100.0%			4
Occupation	House wife	19	54.3%	16	45.7%	35	$\chi^2=5.45$ p=0.14 DF=3	
	Government. Employed	2	100.0%	0	0.0%			2
	Private employed	9	45.0%	11	55.0%			20
	Self employed	0	0.0%	3	100.0%			3
Income	Rs.2000 - 3000	0	0.0%	5	100.0%	5	$\chi^2=5.63$ p=0.13 DF=3	
	Rs.3001 -4000	5	50.0%	5	50.0%			10
	Rs.4001 -5000	9	52.9%	8	47.1%			17
	>Rs.5000	16	57.1%	12	42.9%			28
Type of family	Nuclear family	21	51.2%	20	48.8%	41	$\chi^2=0.07$ p=0.78 DF=3	
	Joint family	9	47.4%	10	52.6%			19
Area of living	Rural	12	75.0%	4	25.0%	16	$\chi^2=6.67$ p=0.03* DF=2	
	Semi urban	11	55.0%	9	45.0%			20
	Urban	7	29.2%	17	70.8%			24
Age	1- 3 years	16	55.2%	13	44.8%	29	$\chi^2=2.04$ p=0.54 DF=3	
	3- 5 years	7	58.3%	5	41.7%			12
	5- 7 years	3	33.3%	6	66.7%			9
	7- 9 years	4	40.0%	6	60.0%			10
Sex	Male	20	54.1%	17	45.9%	37	$\chi^2=0.63$ p=0.42 DF=1	
	Female	10	43.5%	13	56.5%			23
Order of birth	First	12	48.0%	13	52.0%	25	$\chi^2=0.58$ p=0.90 DF=3	
	Second	12	48.0%	13	52.0%			25
	Third	5	62.5%	3	37.5%			8
	Fourth and above	1	50.0%	1	50.0%			2
Education	L.K.G	20	54.1%	17	45.9%	37	$\chi^2=0.94$ p=0.82 DF=3	
	U.K.G	2	40.0%	3	60.0%			5
	I st std to 2nd std	5	50.0%	5	50.0%			10
	3rd std to 4th std	3	37.5%	5	62.5%			8

Gain score calculation of Posttest score – Pretest score = difference score is called gain score. This gain score average is 5. The Knowledge level gain score average is 9. The Practice level gain score average is 5.

The study showed there is a significance in between knowledge and Practice level gain score and Mother's demographic variables. Elder age, more education and urban mothers are having more knowledge than others.

Majority of the Children according to the age (48.3%) were 1-3 years, and 3-5 years (20%), sex of male children (61.7%) and female children (38.3%), order of birth (41.7%) were first, followed (41.7%) were second and the education level (61.7%) were in L.K.G level.

The study showed there is a significance between the age, sex and education level, the Toddler and Preschooler, Male children than female children, children at primary education level were more prone to Bronchial asthma

The Effectiveness on Demonstration of spacer to mothers of asthmatic children:

Knowledge: pretest - 40.7% posttest - 84.8%; % of gain ↑44.1%

Practice: pretest – 32.2% post-test - 84.0%; % of gain ↑51.8%.

The Knowledge level gain score average is 9. The Practice level gain score average is 5.

In knowledge posttest (16.97±1.55) mean score was higher than. Pretest (8.13±3.59) knowledge mean score. The calculated t value $t=16.92$ $p=0.001^{***}$ was lesser than tabulated value $P\leq 0.05$ level of significance.

There is a high level significance between the knowledge & Practice level score for mothers of asthmatic children with their selected demographic variables.

Conclusion:

Majority of the mothers participated in the study have some knowledge regarding spacer techniques in the management of children suffering from asthma and gave free and frank responses regarding demonstration of spacer. The study concluded that a Spacer is a novel device, economical, easy to handle and care, comfortable, prevent cross infection and more effective in delivery of aerosol drugs than other inhalation techniques for asthmatic children. The Results showed, using the valve holding spacer device, significantly more effective device Parental adherence to prescribed frequency and the delivery technique of the children also showed improved satisfaction and willingness to use the device. A well planned educative intervention programme like demonstration of spacer techniques will improve the knowledge & Practice level of mothers in management of asthmatic children. Findings of the study indicated that Demonstration of Spacer technique was very effective in improving the knowledge and practice level of the mothers of asthmatic children. Mothers must be provided with opportunities to upgrade their knowledge. Educational information can be imparted to the Parents in the form of teaching programme about newer technology like spacer as part of Nursing Practice.

Nursing Implication: There are limited studies in nursing, the area of using of spacer device in asthma management. There is a great need for research in childhood asthma management with delivery of aerosol drugs in Nursing.

- The study can be done to assess the effectiveness of different spacer devices.
- The evaluative study provides baseline for conducting other research studies.
- The study will be a motivation for budding researchers to conduct similar studies on a large scale
- The study will be a reference for research scholars

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