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A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge Regarding the care of chest tube drainage for Staff Nurses at Selected Hospitals, Bengaluru

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Abstract:

Introduction: Managing patients with chest drains is crucial in nursing practice. However, nurses often lack adequate knowledge in this area. This study evaluates the impact of a structured teaching program on enhancing nurses' knowledge in caring for patients with chest drains.

Method and Material: A pre-experimental one-group pretest-posttest research design was used with 60 staff nurses selected through non-probability convenient sampling. A structured knowledge questionnaire was used for data collection, consisting of two sections: Section A for socio-demographic data and Section B for knowledge regarding care of chest drainage. Descriptive and inferential statistics were used for data analysis.

Result: The pretest revealed a majority of staff nurses had a low mean percentage score (21.4%) and a standard deviation (SD) of 2.71 in knowledge regarding chest drain care. After the structured teaching program, the posttest showed a higher mean percentage score (32.8%) and a lower SD of 2.36. Statistical analysis using the paired t-test indicated a highly significant improvement in knowledge scores ($p<0.05$), with a paired t-test value of 12.568.

Conclusion: The study demonstrated that the structured teaching program was effective in enhancing the knowledge of staff nurses regarding the management of patients with chest drains. There is a clear need for such programs to improve the quality of patient care.

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Keywords:

Structured teaching program, chest drainage, chest drain care, staff nurses, knowledge enhancement.

Introduction

The lungs, vital organs of the respiratory system, play a crucial role in maintaining homeostasis by facilitating the exchange of oxygen and carbon dioxide in the body. Positioned within the thoracic cavity and protected by the ribcage, each lung is anatomically characterized by its cone-shaped structure, with the apex located beneath the clavicle and the base resting on the diaphragm. [1,2] These organs are divided into lobes by fissures, with the right lung typically consisting of three lobes and the left lung of two.[3]

Composed primarily of millions of alveoli, the lungs are predominantly airy structures, rendering them soft, spongy, and relatively lightweight.[4,5] The alveoli, small air sacs clustered at the terminal ends of the bronchial tree, serve as the primary site for gas exchange between the respiratory and circulatory systems[4]. Surrounding the alveoli is a network of elastic pulmonary connective tissue, contributing to the lungs' resilience and elasticity during breathing.[6,7,8]

The process of gas exchange occurs within the lungs' intricate internal environment, characterized by warmth, moisture, and protection.[9,10,11,12] This conducive setting enables the efficient transfer of oxygen from inhaled air into the bloodstream and the removal of carbon dioxide from the bloodstream into exhaled air. [13,14,15] Encasing the outer surfaces of the lungs is a thin, protective membrane known as the pleura, which reduces friction during respiratory movements.[16,17,18]

This study aims to address several key objectives related to the care of patients with chest tube drainage among staff nurses. Firstly, it seeks to assess the baseline and post-intervention knowledge levels of staff nurses regarding the care of patients with chest tube drainage. Secondly, the study aims to evaluate the effectiveness of a structured teaching program designed to enhance staff nurses' proficiency in caring for patients with chest tube drainage. Lastly, the study aims to explore potential associations between pre- and post-intervention knowledge scores among staff nurses and selected demographic variables. By addressing these objectives, the study seeks to contribute to the body of knowledge surrounding optimal care

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practices for patients undergoing chest tube drainage, ultimately aiming to enhance patient outcomes and improve nursing care delivery.

Methodology:

The research approach adopted for this study was an evaluative research approach, aimed at assessing the effectiveness of a structured teaching program on the knowledge regarding the care of chest tube drainage among staff nurses. The research design utilized was a pre-experimental one-group pre-test and post-test design. The study was conducted in selected hospitals, with the population consisting of all staff nurses working within these hospitals. A sample of 60 staff nurses was selected using a non-probability convenient sampling technique. Data was collected directly from the staff nurses working in the hospital setting.

The independent variable in this study was the structured teaching program on knowledge regarding care of chest tube drainage, while the dependent variable was the level of knowledge on the care of chest drainage among the participating staff nurses. This research design allowed for the evaluation of the impact of the structured teaching program on the knowledge levels of the staff nurses regarding chest drainage care.

Result:

The data is organized, analysed and prescribed in following section:

- Section A: Distribution of staff nurses based on frequency and percentage of demographic characteristic.
- Section B: Findings the related to knowledge score regarding the care of chest drain among staff nurses.
- Section C: Findings related to effectiveness of the Structured teaching programme by comparing the pre-test and post-test knowledge score regarding the care of chest drain.
- Section D: Findings related to association between pre-test and post-test knowledge scores with selected demographic variables

Section A: Distribution of staff nurses based on frequency and percentage of demographic characteristic

The study included 60 staff nurses with varying demographic characteristics. The age distribution showed that 46.6% of the respondents were aged 21-25 years, 21.6% were 26-30 years, 18.3% were 31-35 years, and 13.3% were 36-40 years old. In terms of gender, 43.3% were male and 56.6% were female.

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Regarding educational status, 26.6% had completed General Nursing and Midwifery (G.N.M.), 30% had a Bachelor of Science in Nursing (B.Sc.), 23.3% had a Post Basic Bachelor of Science in Nursing (P.B.B.Sc.), and 20% had postgraduate qualifications in nursing. The department distribution indicated that 43.3% worked in the ICU, 33.3% in the pulmonary medicine ward, and 23.3% in the post-operative ward.

Years of experience varied, with 46.6% having 0-2 years, 35% having 3-5 years, and 18.3% having more than 5 years of experience. In terms of previous educational programs attended, 21.6% had attended such programs, while 78.3% had not. The frequency of encountering patients with chest drains showed that 31.6% saw them within three months, 13.3% within six months, 10% within a year, and 45% almost always.

Table 1: Frequency and percentage distribution of subject based on demographic variables

Sl no.	Variables	Category	Respondents	
			Frequency	Percentage
1	Age	21-25yr	28	46.6
		26-30yr	13	21.6
		31-35yr	11	18.3
		36-40yr	8	13.3
2	Gender	Male	26	43.3
		Female	34	56.6
3	Educational status	G. NM	16	26.6
		BSC	18	30
		P. B. B. Sc.	14	23.3
		Post graduate Nursing	12	20
4	Department Where Working	ICU	26	43.3
		Pulmonary medicine ward	20	33.3
		Post operative ward	14	23.3
5	Years of experience	0-2yr	28	46.6
		3-5yr	21	35
		>5yr	11	18.3
6	Previous educational Programme Attended	Attended	13	21.6
		Not Attended	47	78.3
7	Frequency of patients	In the three months	19	31.6
		In six months	8	13.3

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		In a year	6	10
		Almost always	27	45

Section B: Findings the related to knowledge score regarding the care of chest drain among staff nurses.

Table 2: Classification of subjects according to pretest level of knowledge

Knowledge regarding care of CD	Pretest level of knowledge	
	Frequency	**Percentage**
Inadequate knowledge (0-12)	30	50
Moderate knowledge (13-18)	18	30
Adequate knowledge (19-35)	12	20

Table 2 presents the classification of subjects based on their pretest level of knowledge regarding the care of chest drainage. The results show that 50% of the staff nurses had inadequate knowledge, scoring between 0-12. Meanwhile, 30% demonstrated moderate knowledge with scores ranging from 13-18, and 20% had adequate knowledge, scoring between 19-35. This distribution indicates a significant proportion of the staff nurses had limited knowledge about chest drainage care before the intervention.

Table 3: Classification of subjects according to post-test level of knowledge

Knowledge regarding care of CD	Post-test level of knowledge	
	Frequency	Percentage
Inadequate knowledge (0-12)	0	0
Moderate knowledge (13-18)	18	30
Adequate knowledge (19-35)	42	70

Table 3 presents the classification of subjects based on their post-test level of knowledge regarding the care of chest drainage. After the structured teaching program, none of the staff nurses had inadequate knowledge (0-12). The proportion of nurses with moderate knowledge

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(13-18) was 30%, while 70% had adequate knowledge (19-35). This significant shift from pretest levels indicates that the structured teaching program was highly effective in enhancing the knowledge of staff nurses about chest drainage care.

Table 4: Aspect-wise distribution of pre-test mean, standard deviation, mean percentage of knowledge scores regarding the care of chest drain among staff nurses

Sl. No.	Aspects of knowledge	No. of statement	Max score	Mean	SD	Mean Percentage
1	Knowledge regarding anatomy and physiology	**7**	**7**	3.14	1.11	8.971
2	Knowledge regarding indication for chest drain	8	8	3.41	1.42	9.742
3	Knowledge regarding the care of chest drain	20	20	7.49	2.71	21.4

Table 4 details the pre-test mean, standard deviation (SD), and mean percentage of knowledge scores across different aspects of chest drain care among staff nurses. The knowledge regarding anatomy and physiology of the chest had a mean score of 3.14 with an SD of 1.11, corresponding to a mean percentage of 8.971%. For the knowledge regarding indications for chest drain, the mean score was 3.41 with an SD of 1.42, and a mean percentage of 9.742%. The knowledge regarding the care of chest drains had a mean score of 7.49, an SD of 2.71, and a mean percentage of 21.4%. These results highlight the varying levels of baseline knowledge among staff nurses across different aspects of chest drain care.

Table 5: Aspect-wise distribution of post-test mean, standard deviation, mean percentage of knowledge scores regarding the care of chest drain among staff nurses

Sl. No	Aspects of knowledge	No. of statements	Max score	Mean	SD	Mean percentage
1	Knowledge regarding anatomy and physiology	7	7	5	0.91	14.285

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2	Knowledge regarding indication for chest drain	8	8	5.8	0.99	16.571
3	Knowledge regarding the care of chest drain	20	20	13.12	2.36	37.485

Table 5 presents the post-test mean, standard deviation (SD), and mean percentage of knowledge scores for different aspects of chest drain care among staff nurses. The knowledge regarding the anatomy and physiology of the chest had a post-test mean score of 5.0 with an SD of 0.91, resulting in a mean percentage of 14.285%. For the knowledge regarding indications for chest drain, the mean score was 5.8 with an SD of 0.99, and a mean percentage of 16.571%. The knowledge regarding the care of chest drains had a mean score of 13.12, an SD of 2.36, and a mean percentage of 37.485%. These results demonstrate a significant improvement in the knowledge levels of staff nurses across all aspects of chest drain care following the structured teaching program.

Table 6: Mean, SD and mean percentage and gain in mean score percentage of knowledge of staff nurses regarding care of chest drain before and after STP

Aspects of knowledge	**Max score**	**Pre-Test**			**Post-Test**			**% Gain in mean**	**t' score**	**p value**	**Inference**
		Mean	**SD**	**Mean %**	**Mean**	**SD**	**Mean%**				
Knowledge regarding anatomy and physiology	7	3.14	1.11	8.97	5	0.91	14.3	5.31	11.7	<.00001	S
Knowledge regarding indication for chest drain	8	3.41	1.42	9.74	5.8	0.99	16.6	6.83	8.75	<.00001	S
Knowledge regarding the care of chest drain	20	7.49	2.71	21.4	13.1	2.36	37.4	16.1	10.9	<.00001	S

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Table 6 summarizes the mean, standard deviation, mean percentage, and gain in mean score percentage of staff nurses' knowledge regarding chest drain care before and after a structured teaching program (STP). The pre-STP mean percentages for knowledge regarding anatomy and physiology, indications for chest drain, and care of chest drain were 8.971%, 9.742%, and 21.4% respectively. Post-STP, these percentages increased significantly to 14.3%, 16.6%, and 37.4% respectively, with gains ranging from 5.314% to 16.085%. Paired t-tests showed highly significant differences ($p < 0.00001$) between pre- and post-STP scores, indicating the program's effectiveness. The total gain in mean score percentage across all aspects was 28.228%, highlighting a substantial improvement in knowledge levels post-STP.

Section C: Findings related to effectiveness of the Structured teaching programme by comparing the pre-test and post-test knowledge score regarding the care of chest drain.

Table 7: Comparison between pretest and post-test knowledge and finding 'z' score

Sl No.	Knowledge regarding care of CD	Pretest level of knowledge		Post test level of knowledge		'z' score	'p' value
		Frequency	Percentage	Frequency	Percentage		
1	Inadequate knowledge (0-12)	30	50	0	0	6.324	<0.00001
2	Moderate knowledge (13-18)	18	30	18	30	0	1
3	Adequate knowledge (19-35)	12	20	42	70	-5.504	<0.00001

Table 7 compares the pretest and post-test knowledge levels regarding the care of chest drains among staff nurses, along with the corresponding 'z' scores and p-values. Before the

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intervention, 50% of the nurses had inadequate knowledge (0-12), which decreased to 0% post-intervention, resulting in a 'z' score of 6.324 and a highly significant p-value of <0.00001. Similarly, the proportion of nurses with moderate knowledge (13-18) remained the same at 30% pre- and post-intervention, resulting in a 'z' score of 0 and a p-value of 1. In contrast, the proportion of nurses with adequate knowledge (19-35) increased from 20% pre-intervention to 70% post-intervention, resulting in a 'z' score of -5.504 and a highly significant p-value of <0.00001. These findings indicate a significant improvement in knowledge levels among staff nurses after the structured teaching program.

Table 8: Comparison between pre-test and post-test knowledge score

Sl. No.	Aspect	Max score	Mean	SD	Mean %	Paired 't' value	df	'p' value
1	Pretest knowledge	35	14.04	5.2	40.113	12.568	59	<0.00001
2	Post test knowledge	35	23.92	4.3	68.341			
3	Enhancement		9.27	-0.9	28.228			

Table 8 presents a comparison between the pre-test and post-test knowledge scores among staff nurses regarding chest drain care. The pre-test knowledge had a mean score of 14.04, a standard deviation (SD) of 5.2, and a mean percentage of 40.113%. Post-test knowledge scores significantly increased to a mean score of 23.92, an SD of 4.3, and a mean percentage of 68.341%. The paired 't' test value was 12.568 with 59 degrees of freedom, resulting in a highly significant p-value of <0.00001. The enhancement in knowledge between pre-test and post-test was 9.27, indicating a substantial improvement. These findings underscore the effectiveness of the structured teaching program in enhancing the knowledge of staff nurses regarding chest drain care.

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Section D: Findings related to association between pre-test and post-test knowledge scores with selected demographic variables

Table 9: Summary association between pre-test knowledge and selected demographic variables

Sl. No.	Characteristics	Category	Respondents			Chi Square	df	p value	Inference
			Inad	Mod	Adeq				
1	Age	21-25yrs	15	7	6	5.84	6	0.44	NS
		26-30yrs	6	4	3				
		31-35yrs	3	6	2				
		36-40yrs	6	1	1				
2	Gender	Male	12	9	5	0.47	2	0.788	NS
		Female	18	9	7				
3	Educational status	G.N.M	6	7	3	8.96	6	0.17	NS
		B.Sc.	8	4	6				
		P. B. B. Sc.	7	6	1				
		PG Nursing	9	1	2				
4	Department where working	ICU	16	6	4	9.1	4	0.05	NS
		PMW	9	4	7				
		POW	4	8	2				
5	Years of Experience	0-2year	13	9	6	2.89	4	0.57	NS
		3-5years	9	7	5				
		>5year	8	2	1				
6		Attended	5	6	2	2.06	2	0.35	NS

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	Attended any educational programme on chest drain care	Not Attended	25	12	10				
7	Frequency of patients with chest drain in your ward	In three months	9	9	1	14.18	6	0.027	S
		In six months	3	4	1				
		In a year	1	2	3				
		Almost always	17	3	7				

Table 9 summarizes the association between pre-test knowledge levels of chest drain care and selected demographic variables among staff nurses. Variables include age, gender, educational status, department of work, years of experience, attendance at educational programs on chest drain care, and frequency of encountering patients with chest drains. Chi-square tests were used, showing significant associations with the department of work ($p = 0.05$) and the frequency of encountering patients with chest drains ($p = 0.027$). These results suggest potential influences on pre-test knowledge levels.

Table 10: Summary association between post-test knowledge and selected demographic variables

Sl. No.	Characteristics	Category	Respondents		Chi square	df	p value	Inference
			Moderate	Adequate				
1	Age	21-25yrs	8	20	1.4	3	0.7	NS
		26-30yrs	5	8				
		31-35yrs	2	9				
		36-40yrs	3	5				
2	Gender	Male	7	19	0	1	0.8	NS
		Female	10	24				

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3	Educational status	G.N.M	5	11	0.1	3	0.9	NS
		B. Sc.	5	13				
		P. B. B. Sc.	4	10				
		PG Nursing	4	8				
4	Department where working	ICU	7	19	0.3	2	0.8	NS
		PMW	6	14				
		POW	5	9				
5	Years OF Experience	0-2year	9	19	0.1	2	0.9	NS
		3-5years	6	15				
		>5year	3	8				
6	Attended any educational programme on chest drain care	Attended	2	11	1.7	1	0.2	NS
		Not Attended	16	31				
7	Frequency of patients with chest drain in your ward	In three months	2	13	1.1	3	0.8	NS
		In six months	2	6				
		In a year	1	5				
		Almost always	10	17				

Table 10 summarizes the association between post-test knowledge levels of chest drain care and selected demographic variables among staff nurses. The variables include age, gender, educational status, department of work, years of experience, attendance at educational programs on chest drain care, and frequency of encountering patients with chest drains. Chi-square tests were conducted to assess the association, with degrees of freedom (df) and corresponding p-values provided. The inference column indicates whether the association is

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statistically significant (S) or not significant (NS). The results indicate that there were no significant associations between post-test knowledge levels and the demographic variables studied.

Table 11: Association between demographic variables

Parameters	Knowledge Score Pre-Test			Chi square	p value	Knowledge Score Post Test		Chi square	p value
	Inad	Mod erate	Adeq uate			Mod erate	Adeq uate		
Age									
21-25years	15	7	6	5.84	0.44	8	20	1.416	0.7
26-30years	6	4	3			5	8		
31-35years	3	6	2			2	9		
36-40years	6	1	1			3	5		
Gender									
Male	12	9	5	0.47	0.788	7	19	0.0449	0.83
Female	18	9	7			10	24		
Educational status									
G.N.M	6	7	3	8.96	0.17	5	11	0.1313	0.945
B.Sc.	8	4	6			5	13		
P. B. B. Sc.	7	6	1			4	10		
PG Nursing	9	1	2			4	8		
Department Where Working									
ICU	16	6	4	9.1	0.05	7	19	0.33	0.84
PMW	9	4	7			6	14		

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POW	4	8	2			5	9		
Years of experience									
0-2year	13	9	6	2.89	0.57	9	19	0.12	0.94
3-5years	9	7	5			6	15		
>5year	8	2	1			3	8		
Attended any educational programme									
Attended	5	6	2	2.06	0.35	2	11	1.68	0.19
Not Attended	25	12	10			16	31		
Frequency of patient with chest drain in your ward									
In three months	9	9	1	14.18	0.27	2	13	1.14	0.76
In six months	3	4	1			2	6		
In a year	1	2	3			1	5		
Almost always	17	3	7			10	17		

Table 11 illustrates the association between demographic variables and knowledge scores before and after the intervention. The table categorizes respondents into inadequate, moderate, and adequate knowledge levels for both pre-test and post-test scores. Chi-square tests were conducted to assess the association between demographic variables such as age, gender, educational status, department of work, years of experience, attendance at educational programs, and frequency of encountering patients with chest drains. The table shows the chi-square value and p-value for each association. Overall, the results suggest that there were no significant associations between demographic variables and knowledge scores, both before and after the intervention.

Discussion:

Based on the age distribution of 60 samples, 28 (46.6%) were between 21-25 years old, 13 (21.6%) were between 26-30 years old, 11 (18.3%) were between 31-35 years old, and the remaining 8 (13.3%)

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were between 36-40 years old. In terms of gender, 26 (43.3%) of the subjects were male, while the remaining 34 (56.6%) were female.

Regarding educational status, the majority of the samples, 18 (30%), held a B.Sc. in Nursing, 16 (26.6%) were G.N.M. (General Nursing and Midwifery), 14 (23.3%) held a P.B.B.Sc. in Nursing, and 12 (20%) were postgraduate nurses. Most of the staff nurses selected for the study, 26 (43.3%), worked in the ICU, 20 (33.3%) worked in the pulmonary medicine ward, and 14 (23.3%) worked in the postoperative ward.

The years of experience of the staff nurses were as follows: 28 (46.6%) had 0-2 years of experience, 21 (35%) had 3-5 years of experience, and 11 (18.3%) had more than 5 years of experience. Additionally, 47 (78.3%) of the study subjects had not attended any educational program on chest drain care, while 13 (21.6%) had attended such a program.

Regarding the frequency of encountering patients with chest drains, 27 (45%) reported that patients with chest drains were almost always available, 19 (31.6%) said the frequency was every three months, 8 (13.3%) reported a frequency of every six months, and 6 (10%) reported a frequency of once a year in their ward.

The aspect-wise pre-test knowledge scores regarding the care of chest drains among staff nurses showed the following mean percentage scores and standard deviations (SD): knowledge regarding anatomy and physiology had a mean percentage of 8.97% and an SD of 1.11; knowledge regarding indications for chest drains had a mean percentage of 9.74% and an SD of 1.42; and knowledge regarding the care of chest drains had a mean percentage of 21.4% and an SD of 2.71.

The post-test knowledge scores showed an improvement: knowledge regarding anatomy and physiology had a mean percentage of 12.5% and an SD of 0.91; knowledge regarding indications for chest drains had a mean percentage of 14.5% and an SD of 0.99; and knowledge regarding the care of chest drains had a mean percentage of 32.8% and an SD of 2.36.

The findings revealed that after the structured teaching program (STP), 42 staff nurses (70%) achieved an adequate level of knowledge, 18 staff nurses (30%) achieved a moderate level of knowledge, and none remained with inadequate knowledge in the post-test. The study demonstrated that the post-test mean percentage knowledge score (mean percentage = 68.341, SD = 4.3) was significantly higher than the pre-test mean percentage knowledge score (mean percentage = 40.113, SD = 5.2), showing an enhancement of the mean percentage by 28.143.

Conclusion:

The study conclusively demonstrated that the structured teaching program significantly enhanced the knowledge of staff nurses regarding the care of chest tube drainage. This was evidenced by the substantial increase in mean knowledge scores from pretest to posttest, with

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the paired t-test showing highly significant improvement ($p<0.00001$). The program effectively addressed the initial knowledge gaps, with all participants achieving at least moderate knowledge post-intervention, and a notable shift towards adequate knowledge levels. The findings underscore the importance and efficacy of structured educational interventions in nursing practice, highlighting their critical role in improving patient care quality and outcomes.

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