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A Study to Assess the Effectiveness of Hands-On Training Programme on Knowledge and Practice regarding Use of Incentive Spirometry in Patients Undergoing Cardiac Surgery in Selected Hospital at Kanpur

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Abstract: ***Background: Following surgery patients are at risk of developing respiratory complications such as atelectasis, pneumonia and respiratory muscle weakness. Incentive spirometry serves as a proactive measure to counteract these risks by promoting lung expansion, enhancing secretion clearance and maintaining respiratory muscle strength. Incentive spirometry is a widely used routine clinically procedure for prophylactic and treatment regimen as a perioperative respiratory therapy. Objective: The objective of the study is to assess the effectiveness of hands - on training programme on knowledge and practice regarding use of incentive spirometry in patients undergoing cardiac surgery in selected hospital at Kanpur. Materials and methods: Quasi - experimental non - randomized control group design is adopted for this study. The study was conducted at LPS Institute of Cardiology, Kanpur. The sample size was 70. These 70 patients were divided into experimental and control group (35 samples in each group). Non - probability purposive sampling technique was used. Results: The result showed that hands - on - training programme was highly effective for patients undergoing cardiac surgery according to the level of knowledge and practice before and after intervention. For level of knowledge in experimental group, the calculated 't' value (- 22.774) was statistically highly significant at 0.05 level of significance. For level of practice in experimental group, the calculated 't' value (63.185) was statistically highly significant at 0.05 level of significance. Conclusion: Incentive spirometry serves as an educational tool, empowering patients to take an active role in their preoperative preparation and postoperative recovery. By teaching proper breathing techniques and encouraging regular practice, it enhances patient compliance and engagement with pre - rehabilitation programs leading to better outcomes.***

Keywords: effectiveness, hands - on training programme, knowledge, practice, incentive spirometry, cardiac surgery

1. Introduction

For a state of complete wellness postoperative recovery is very essential part. It can be attained by achieving a level of independence that is to perform activity of daily living. Postoperative pulmonary complications are more common after cardiac surgery and are a leading cause of morbidity, inhibit oxygenation, increase length of stay in hospital and mortality. According to a study conducted in 2022, the incidence of pulmonary complications after surgery are 30 - 60%. [1] A study conducted by Naveed A, et. al. on incidence and risk factors of pulmonary complications after cardiopulmonary bypass in 2017 states that development of postoperative pulmonary complications after cardiac surgery is associated with an increased length of hospital stay, longer ICU admission significantly affecting health care costs in cardiac surgery patients. [2] A study conducted by Damag A, et. al. on incidence and outcome of pulmonary complications after open cardiac surgery in 2013. The results showed that Atelectasis is the most common pulmonary complication occurred after cardiac surgery with the prevalence of about 70% of cases. [3] After surgery, it may be hard to take deep breaths and if patient do not breathe deeply enough this can lead to pulmonary complications. [4] So incentive spirometry serves as an educational tool, empowering patients to take an active role in their preoperative preparation and postoperative recovery. It is a valuable component of perioperative care, promoting optimal respiratory function, reducing complication and enhancing overall surgical outcomes by promoting lung expansion, facilitating secretion clearance, preventing respiratory muscle weakness, enhancing patient engagement and compliance and facilitating early mobilization. A study conducted by Eltorai et. al. on Incentive spirometry Adherence in 2018 revealed that patient adherence with Incentive Spirometry is poor (86%) and the most common factor was patients do not use incentive spirometry effectively. [5] By teaching proper breathing techniques and encouraging regular practice, it enhances patient compliance and engagement with pre - rehabilitation programs leading to better outcomes.

2. Methods

A quasi - experimental study was conducted at LPS Institute of Cardiology, Kanpur to assess the effectiveness of hands - on training programme on knowledge and practice regarding use of incentive spirometry in patients undergoing cardiac surgery.

Research Design: Quasi - experimental non - randomized control group design

Variables:
Independent variables: hands - on training programme

Dependent variables: knowledge and practice of patients undergoing cardiac surgery on use of incentive spirometry

Demographic variables: Age, gender, educational status, occupation, residence, economic status, previous information about spirometry, type of surgery

Research setting: LPS Institute of Cardiology, Kanpur

Sample: The sample for the present study includes patient undergoing cardiac surgery at LPS Institute of Cardiology, Kanpur.

Sample size: The total sample of the study was 70; 35 samples in each group.

Sampling technique: In this study **Non- probability purposive sampling technique** was used.

Description of tools: A structured knowledge questionnaire and practice observation checklist were used for data collection. It consists of three sections. SECTION A consists of demographic proforma, SECTION B consists of knowledge questionnaire and SECTION C consists of practice observation checklist.

Data collection procedure: Formal written permission was obtained from the Director of LPS Institute of Cardiology, Kanpur on 12/07/24. The main study was conducted from 18/07/24 to 26/08/24. An informed consent was taken from patients undergoing cardiac surgery. A brief introduction was given to the samples regarding the study. Pre - test was conducted on 70 patients (both experimental and control group) undergoing cardiac surgery and followed by hands - on - training programme on experimental group i. e. on 35 patients. Post - test was conducted for the same sample i. e.70 patients after one week using the same tool. Then the raw data was analyzed using descriptive and inferential statistics.

Statistical analysis: The data was analyzed by using descriptive and inferential statistics based on the objectives and hypothesis of the study.

3. Results

It includes five sections:

Section I: Frequency and percentage distribution of experimental group and control group according to their socio - demographic variables

Section II: Frequency and percentage distribution of experimental and control group according to pre - test and post - test level of knowledge and practice.

Section III: Distribution of mean, standard deviation and 't' test values of significant difference between pre - test and post - test level of knowledge and practice in experimental group

Section IV: Comparison of post - test knowledge and practice score between experimental and control group

Section V: Association between pre - test level of knowledge and practice with their selected socio - demographic variables.

Section I

Table 1: Frequency and percentage distribution of samples according to their Socio - demographic variables Experimental group (n=35)

S. no.	Socio - demographic variables	Frequency (f) (n=35)	Percentage (%)
1.	**Age (in years)**		
a)	20 - 35 years	6	17.14
b)	36 - 50 years	9	25.71
c)	51 - 65 years	14	40
d)	>65 years	6	17.14
2.	**Gender**		
a)	Male	27	77.14
b)	Female	8	22.85
c)	Others	0	0
3.	**Educational status**		
a)	Illiterate	6	17.14
b)	Primary school	6	17.14
c)	Secondary school	7	20
d)	Senior secondary school	7	20
e)	Graduate and other higher qualification	9	25.71
4.	**Occupation**		
a)	Unemployed	4	11.42
b)	Government job	5	14.28
c)	Private job	9	25.71
d)	Business	8	22.85
e)	Farmer	9	25.71
5.	**Residence**		
a)	Rural	22	62.85
b)	Urban	13	37.14
6.	**Economic status**		
a)	5000 - 10, 000 per capita income	18	51.42
b)	10,000- 15, 000 per capita income	6	17.14
c)	15,000- 20,000 per capita income	6	17.14
d)	>20, 000 per capita income	5	14.28
7.	**Previous knowledge**		
a)	Through hospital	24	71.42
b)	Through family	0	0
c)	Through family	0	0
d)	Through friends	1	2.85
e)	No information	10	28.57
8.	**Type of surgery**		
a)	CABG	22	62.85
b)	Other cardiac surgeries	13	37.14

Table 2: Frequency and percentage distribution of samples according to their Socio - demographic variables Control group (n=35)

S. no.	Socio - demographic variables	Frequency (f) (n=35)	Percentage (%)
1.	**Age (in years)**		
a)	20 - 35 years	3	8.57
b)	36 - 50 years	11	31.42
c)	51 - 65 years	18	51.42
d)	>65 years	3	8.57
2.	**Gender**		
a)	Male	26	74.28
b)	Female	9	25.71
c)	Others	0	0
3.	**Educational status**		
a)	Illiterate	6	17.14
b)	Primary school	5	14.28

c)	Secondary school	7	20
d)	Senior secondary school	5	14.28
e)	Graduate and other higher qualification	12	34.28
4.	**Occupation**		
a)	Unemployed	2	5.71
b)	Government job	1	2.85
c)	Private job	12	34.28
d)	Business	9	25.71
e)	Farmer	11	31.42
5.	**Residence**		
a)	Rural	21	60
b)	Urban	14	40
6.	**Economic status**		
a)	5000 - 10, 000 per capita income	20	57.14
b)	10,000- 15,000 per capita income	8	22.85
c)	15,000- 20,000 per capita income	2	5.71
d)	>20, 000 per capita income	5	14.28
7.	**Previous knowledge**		
a)	Through hospital	26	74.28
b)	Through family	0	0
c)	Through family	0	0
d)	Through friends	0	0
e)	No information	9	25.71
8.	**Type of surgery**		
a)	CABG	23	65.71
b)	Other cardiac surgeries	12	34.28

Section II

Table 3: Frequency and percentage distribution of sample according to pre - test and post - test level of knowledge Experimental group (n=35)

S. no.	Knowledge regarding use of incentive spirometry	Level of knowledge					
		Inadequate (0 - 9)		Moderate (10 - 18)		Adequate (19 - 27)	
		f	%	f	%	f	%
1.	Pre - test	20	57.14%	15	42.85%	0	0%
2.	Post - test	0	0%	10	28.57%	25	71.42%

Table 4: Frequency and percentage distribution of sample according to pre - test and post - test level of knowledge Control group (n=35)

S. no.	Knowledge regarding use of incentive spirometry	Level of knowledge					
		Inadequate (0 - 9)		Moderate (10 - 18)		Adequate (19 - 27)	
		F	%	f	%	f	%
1.	Pre - test	28	80%	6	17.14%	1	2.85%
2.	Post - test	28	80%	7	20%	0	0%

Table 5: Frequency and percentage distribution of sample according to pre - test and post - test level of practice Experimental group (n=35)

S. no.	Practice Score	Level of practice					
		Not able to perform (0 - 6)		Inadequate performance (7 - 12)		Adequate performance (13 - 18)	
		F	%	f	%	f	%
1.	Pre - test	0	0%	35	100%	0	0%
2.	Post - test	0	0%	0	0%	35	100%

Table 6: Frequency and percentage distribution of sample according to pre - test and post - test level of practice Control group (n=35)

S. no.	Practice Score	Level of practice					
		Not able to perform (0 - 6)		Inadequate performance (7 - 12)		Adequate performance (13 - 18)	
		f	%	f	%	f	%
1.	Pre - test	0	0%	35	100%	0	0%
2.	Post - test	0	0%	35	100%	0	0%

Section III

Table 7: Distribution of mean, standard deviation and 't' test values of significant difference between pre - test and post - test level of knowledge in experimental group Experimental group (n=35)

S. No.	Level of Knowledge	Mean	Mean difference [Enhancement]	SD	Paired 't' test		Level of significance
					Calculated value	Table value	
1.	Pre - test	8.05	- 12.178	8.960	- 22.774 df = 34	2.023	p<0.05
2.	Post - test	20.228		3.098			

Table 8: Distribution of mean, standard deviation and 't' test values of significant difference between pre - test and post - test level of practice in experimental group Experimental group (n=35)

S. No.	Level of Practice	Mean	Mean difference [Enhancement]	SD	Paired 't' test		Level of significance
					Calculated value	Table value	
1.	Pre - test	9.114	- 8.886	1.607	- 63.185 df = 34	2.023	p<0.05
2.	Post - test	18		0			

Section IV

Table 9: Comparison of post - test knowledge level between experimental and control group

S. No.	Level of Knowledge	Mean	Mean difference [Enhancement]	SD	Unaired 't' test		Level of significance
					Calculated value	Table value	
1.	Post - test knowledge in experimental group	20.228	14.22	3.098	9.26 df = 68	1.994	p<0.05
2.	Post - test knowledge in control group	6		8.544			

Table 10: Comparison of post - test practice level between experimental and control group

S. No.	Level of Practice	Mean	Mean difference [Enhancement]	SD	Unaired 't' test		Level of significance
					Calculated value	Table value	
1.	Post - test practice in experimental group	18	9.315	0	59.33 df = 68	1.994	p<0.05
2.	Post - test practice in control group	8.685		0.932			

Section V

Association between pre - test level of knowledge and practice with their selected socio - demographic variables in experimental and control group

In experimental group there is significant association between pre - test knowledge score with selected socio - demographic variable such as residence as calculated value (9.789) is higher than table value. There is no significant association between pre - test knowledge score with selected socio - demographic variables such as age, gender, educational status, occupation, economic status, previous knowledge and type of surgery as table value is higher than calculated value. In control group there is no significant association between pre - test knowledge score with selected socio - demographic variables.

In both experimental group and control group there is no significant association between pre - test practice score with selected socio - demographic variables.

4. Discussion

It was observed in present study that the mean post - test knowledge score was high i. e.20.228 when compared to the mean pre - test knowledge score i. e 8.05. The standard deviation (SD) were 8.960 and 3.098 in pre - test and post - test respectively. The calculated 't' value (- 22.774) was higher than the table value at 0.05 level of significance, which shows that there is significant difference between pre - test and post - test level of knowledge regarding use of incentive spirometry. Thus, indicating hands - on training programme was highly effective.

The mean post - test practice score was high i. e.18 when compared to the mean pre - test practice score i. e.9.114. The standard deviation (SD) were 1.607 and 0 in pre - test and post - test respectively. The calculated 't' value (- 63.185) was higher than the table value at 0.05 level of significance, which shows that there is significant difference between pre - test and post - test level of practice regarding use of incentive spirometry. Thus, indicating hands - on training programme was highly effective.

The mean post - test knowledge score of experimental group (20.228) was high when compared to the mean post - test knowledge score of control group (6). The post - test standard deviation (SD) were 3.098 and 8.544 in experimental and control group respectively. The calculated 't' value (9.26) was higher than the table value at 0.05 level of significance, which shows that there is significant difference of post - test level of knowledge regarding use of incentive spirometry between experimental and control group. Thus indicating hands - on training programme was highly effective.

The mean post - test practice score of experimental group (18) was high when compared to the mean post - test practice score of control group (8.685). The post - test standard deviation (SD) were 0 and 0.932 in experimental and control group respectively. The calculated 't' value (59.33) was higher than the table value at 0.05 level of significance, which shows that there is significant difference of post - test level of practice regarding use of incentive spirometry between experimental and control group. Thus, indicating hands - on training programme was highly effective.

Limitations of the Study

There is no randomization in the present study.

5. Conclusion

The study revealed that hands - on - training programme regarding use of incentive spirometry was highly effective in improving knowledge and practice of patients undergoing cardiac surgery. The incentive spirometry plays a vital role in postoperative recovery. All nurses who are involved in preoperative and postoperative units should encourage and educate the patients to do it on a regular basis.

6. Recommendations

1) Designing a randomized control trial about the effect of using incentive spirometer on postoperative pulmonary complications among postoperative cardiac patients.
2) A study can be conducted to find out postoperative cardiac patients compliance in using incentive spirometry
3) Expanding the current study in various geographical areas by using larger sample

7. Ethical Considerations:

1) Ethical clearance was taken from ethical clearance committee
2) Written informed consent was taken from subjects.

References

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