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Cover Page Footnote

We express our sincere gratitude to the hospital authorities for their support and all the patients without whose substantial help and co-operation, this study would not have been accomplished.

Pre-operative breathing exercise using instructional demonstration in preventing post-operative pulmonary complications for patients undergoing elective abdominal surgery

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Abstract

Introduction: Pulmonary complications are the largest and serious post-operative complications of thorax and abdomen. Patients' post-operative experience is directly linked to the pre-operative preparations. **Objective** of the study was to evaluate the effect of pre-operative teaching of breathing exercise in terms of knowledge and practice of patients undergoing elective abdominal surgery and on the incidence of post-operative pulmonary complications among patients undergoing elective abdominal surgery. **Methods:** A quantitative evaluative approach with a pre-experimental one group pre-test – post-test design was adopted for the study. Fifty subjects were selected by using purposive sampling technique. Pre-test was checked by using structured knowledge questionnaire on breathing exercise and observational checklist on breathing practice. Post-test knowledge and practice assessment were done on the third post-operative day and the assessment of Post-Operative Pulmonary Complications (PPCs) was done on the fifth post-operative day. **Results:** The mean pre-test knowledge score was 7.48 ± 2.35 and the mean post-test knowledge score was 22 ± 3.51 . The pre-test practice level of majority of the patients was inadequate (46%) whereas the post-test practice level was adequate for majority of patients (64%). The findings of the study revealed that there was significant improvement in knowledge ($t=15.66$, $P<0.05$) and practice ($t=15.08$, $P<0.05$) scores. The total incidence of pulmonary complications throughout the study period was only four percent. **Conclusion:** It is concluded that the nursing personnel need to take initiative in directing, teaching and educating patients about breathing exercise prior to the surgery and instructional demonstration is a good tool for it, by which we can prevent the post-operative pulmonary complications among patients undergoing elective abdominal surgery.

Key words: Instructional demonstration; breathing exercise; patients undergoing elective abdominal surgery; post-operative pulmonary complications

Introduction

Surgery is a stress and anxiety provoking situation for every single patient. The entire health care team shares a common goal in the caring of post-operative patients, that is the safety and complete cure of the patient in the course of treatment. Post-operative

pulmonary complications (PPCs) are frequently a threat to this objective. A common observation is that many of the patients in the post upper abdominal surgery period experience a prohibitive pattern in breathing with a low tidal volume and functional residual volume (McAlister et al., 2003). PPCs are very serious issue in post upper abdominal and thoracic surgery patients. Hypoventilation, aspiration, pneumonia and atelectasis are the very common and important concerns with regard to PPCs. This is the major reason for the long time intensive care stay and financial burden (Fisher, Majumdar, & McAlister, 2002).

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The worldwide incidences of respiratory complication in post-operative patients are 11.7 percent. The post-surgical mortality ranges seven to eight percent, the pneumonia cases alone contribute 10-28 percent. If we consider the Indian scenario, post upper abdominal surgery complications account for 20 – 25 percent and lower abdominal surgery leads to five to ten percent (Deodhar, Mohite, Shirahatti, & Joshi, 1991). A randomized controlled trial was conducted in Brazil among 135 patients undergoing abdominal surgery. Patients were randomly assigned to the intervention group in which they were treated pre and post-operative physiotherapy and the control group received only post-operative physiotherapy. The study findings showed only 25 percent of patients from intervention group and 43.3 percent of patients from control group presented with pulmonary complications in post-operative period (Pasquina, Tramer, Granier, & Walder, 2006).

Six case studies were carried out to investigate the effect of pre-operative physiotherapy and the satisfaction of patients with treatment in Netherlands. The pre-operative treatment consisted of explanation of the risks of developing post-operative complications, training of respiratory function, and extensive breathing exercise. They concluded the study, as pre-operative physiotherapy is playing a significant role in reducing the PPCs (Dronkers, Veldman, Hoberg, van der Waal, & van Meeteren, 2004).

The breathing exercises and physiotherapy play a very important role in the prevention of PPCs in these patients. The researcher felt the need to check the effectiveness of a breathing exercise instructional demonstration in reducing the complications and mortality on these patients.

Objectives

Objectives of the study were to:

1. evaluate the effectiveness of instructional demonstration on breathing exercise in terms of
 - a. improving knowledge on breathing exercise as measured by structured knowledge questionnaire,
 - b. improving practice of breathing exercise as measured by observational checklist and

- c. prevention of Post-operative Pulmonary Complications (PPCs) as measured by observational checklist.

Materials and Methods

The present study adopted a quantitative evaluative approach with a pre-experimental onegroup pre-test – post-test design. The sample consisted of 50 patients posted for elective abdominal surgery in a Government District Hospital in Mangalore, Karnataka. It is a teaching hospital with 705bed strength and six general surgery units. An average of seven to eight elective abdominal surgeries were carried out per day and having a minimum of 100 beds in post-operative wards. The samples were selected using purposive sampling technique. The inclusion criteria for study were adult patients in the age group of 20 to 60 years undergoing elective abdominal surgery under general anaesthesia and were able to read and write Kannada. The researcher used four data collection instruments –

Tool 1: Demographic proforma, to collect the base line socio demographic information about the patients.

Tool 2: A structured knowledge questionnaire consisting of 34 items to assess the patients' knowledge on anatomy and physiology of respiratory system and breathing exercises. Each of the correct response is coded as '1', wrong as '0'. Scores were interpreted as inadequate ($\leq 33\%$), moderate (34-66%) and adequate ($\geq 67\%$) level of knowledge.

Tool 3: An observational checklist was developed to assess the practice of breathing exercise. The checklist consists of the different steps of both diaphragmatic and pursed lip breathing technique in a sequential manner. With this checklist the breathing exercises were assessed by the researcher on the third post-operative day. If the patients were demonstrating it correctly, coded it as Yes- (Score-1), and if they were not demonstrating it correctly, coded it as No- (Score-0). Total score ranged from 0-15. Based on the scores, practice was interpreted as inadequate ($\leq 33\%$), moderate (34-66%) and adequate ($\geq 67\%$) level of practice. If the patients were not

practicing it correctly, researcher made an attempt to correct them after the observation.

Tool 4: An observational checklist to detect the PPCs consisted of 25 items on various symptoms predisposing to PPCs like hypoventilation, aspiration, pneumonia and atelectasis. Patient experiencing any of the particular sign or symptom, item was coded as Yes-1, if not, No-0 with minimum score of 0 and maximum of 25.

The content validity of the tools was obtained from 10 experts, including two anaesthetist and pulmonologist. Agreement was calculated and there were a few grammatical corrections on item construction and was incorporated.

Split half method was used to test the internal consistency of structured knowledge questionnaire and the value was $r=0.86$. Inter rater method was used to test the reliability of observational checklists and both tools were found reliable (Tool 3, $r=0.81$ & Tool 4, $r=0.78$ respectively).

Instructional demonstration: It includes well organized pre-operative teaching strategy of detailed explanation and demonstration of the techniques of breathing exercise with the help of flip charts and pictures, of 20 minutes duration. Researcher included two different types of breathing exercises i.e., diaphragmatic and pursed lip breathing. After the instructional demonstration the researcher made the patients to do return demonstration of the procedure so as to correct the mistakes, if any. The researcher instructed them to repeat the procedure for 15-20 times per day, both pre-operatively as well as post-operatively. On the fifth post-operative day with the help of observational checklist each patient was assessed for the post-test practice of breathing exercise.

Pilot study was conducted among five patients to assess the feasibility and practicability and it was found feasible. Prior permission to conduct the study was obtained from the institution and the authorities concerned. Data collected only after obtaining the informed consent from the subjects. Pre-test knowledge and practice assessment was done by using structured knowledge questionnaire and observational checklist followed with structured

teaching program with demonstration and return demonstration of the breathing exercises was given to each client. Post-test knowledge and practice assessment was done on the third post-operative day and the assessment of PPCs was done on the fifth post-operative day.

Results

The data gathered was coded, summarized in a master data sheet, and analysed using SPSS v16.0. Demographic variables were analysed by using frequency and percentages. Paired 't' test was used to identify the effectiveness of the intervention.

Table 1: Distribution of sample based on Demographic characteristics (n = 50)

Demographic variables	Frequency	Percentage
Age in years		
20-39	8	16
40-59	27	54
60	15	30
Gender		
Male	30	60
Female	20	40
Education		
Primary education	27	54
Secondary education	14	28
Pre university	7	14
Graduate and above	2	4
Place of living		
Rural	36	72
Urban	14	28
Previous history of surgery		
Yes	8	16
No	42	84
Name of surgery planned		
Laparotomy	12	24
Cholecystectomy	9	18
Hernia	11	22
Gastric surgery	13	26
Others	5	10

The data presented in table 1 shows that majority (54%) of the participants were in the age group of 40-59 years. Majority (60%) of the participants were males, 54% had primary education and 72% were living in the rural area. Majority (84%) of the participants did not have history of previous surgery. Among the participants, most of them were posted for gastric surgery i.e. Partial Gastrectomy.

Table 2: Distribution of area wise pre-test—post-test knowledge scores of the study subjects (n = 50)

Areas	No. of items	Knowledge scores					
		Pre-test (A)		Post-test (B)		Mean Difference (B-A)	
		Mean	SD	Mean	SD	Mean	SD
Area I	12	2.62	1.2	5.24	1.06	2.62	1.71
Area II	22	4.8	1.62	10.52	3.09	5.72	3.08
Total	34	7.48	2.35	15.68	3.51	8.2	3.70

The data presented in table 2 shows the comparison of the areawise mean and SD of the knowledge scores. In the area of 'knowledge regarding anatomy and physiology of respiratory system' Area I had increase in the post-test knowledge scores with

the mean difference of 2.62 ± 1.71 . In the area of 'knowledge regarding breathing exercise' Area II had increase in the post-test knowledge scores with the mean difference of 5.72 ± 3.08 .

Table 3: Distribution of pre-test—post-test knowledge scores of the study subjects. (n=50)

Knowledge Level	Pre-test			Post-test			t-test _(df)	p - value
	Frequency	Percentage	Mean \pm SD	Frequency	Percentage	Mean \pm SD		
Inadequate	43	86	7.48 ± 2.35	4	8	15.68 ± 3.51	$15.66_{(49)}$	0.002*
Moderate	7	14		39	78			
Adequate	-	-		7	14			

The data presented in table 3 shows that the majority of the participants (86%) had inadequate level of knowledge regarding breathing exercise, and showed a greater improvement after the teaching

programme. The findings of the study showed that instructional demonstration was effective in improving knowledge among abdominal surgery patients ($t\text{-test}_{(df)} = 15.66_{(49)}$, $p = 0.002$).

Table 4: Distribution of pre-test—post-test practice scores of the study subjects (n=50)

Practice Level	Pre-test			Post-test			t-test _(df)	p - value
	Frequency	Percentage	Mean \pm SD	Frequency	Percentage	Mean \pm SD		
Inadequate	23	46	3.90 ± 0.75	4	8	6.78 ± 1.15	$15.08_{(49)}$	0.001*
Moderate	23	46		14	28			
Adequate	4	8		32	64			

The data presented in table 4 showed that 46% of participants had inadequate pre-test practice level, 46% moderate and only 8% had adequate practice. Whereas in post-test 64% of participants had adequate level of practice, 28% had moderate level and only 8% had inadequate level of practice. The findings of the study showed that the 't' value (15.08) was significant at 0.05 level. Hence, it was inferred that instructional demonstration was effective in improving practice among abdominal surgery patients. The findings of the study showed that instructional demonstration was effective in improving the practice among abdominal surgery patients ($t\text{-test}_{(df)} = 15.08_{(49)}$, $p = 0.001$).

On the fifth post-operative day with the help of observational check list each patient was assessed

for the development of pulmonary complications. The total incidence of pulmonary complications throughout the study period was only four percent. Hence, it was inferred that instructional demonstration was effective in preventing PPCs among abdominal surgery patients.

Discussion

The findings of the study showed that the mean change between the pre-test and post-test knowledge (15.66 , $p < 0.05$) and practice (15.08 , $p < 0.05$) score was found to be significant and hence, instructional demonstration on breathing exercise was effective in improving the knowledge and practice, as well as preventing post-operative complications among abdominal surgery patients. The present study findings were supported by a single-blind randomized

controlled pilot study, done to investigate the efficacy of pre-operative respiratory muscle training, on the incidence of PPCs in patients scheduled for elective upper abdominal surgery patients. Three in the experimental tail and eight patients in the control tail developed PPCs ($p=0.07$) (Dronkers, Veldman, Hoberg, VanDerWaal, VanMeeteren, 2008).

The present study findings are contradicting with the findings of the study by Dronkers et al. (2010) to identify the effect of pre-operative breathing exercise session for older adults posted for elective abdominal oncological surgery in Netherlands. Forty-two older adults above the age group of 60 years were randomly assigned to the intervention and control group. The study concluded that there was no significant difference between PPCs and duration of hospital stay between experimental and control groups.

Limitations of the study: Lack of control group and random sampling technique hinders the generalization of results. Samples were selected from only one hospital, so generalization of findings are restricted to the selected hospital.

Conclusion

The results of the present study showed that instructional demonstration on breathing exercise was effective in terms of improving the knowledge and practice, as well as preventing the post-operative pulmonary complications among abdominal surgery patients. The nursing personnel need to take initiative in directing, teaching and educating patients about breathing exercise prior to the surgery and instructional demonstration is a good tool for it.

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