A Study to Assess the Outcome of Self Instructional Module for Nurses on Nursing Management of Patients with Chest Tube Drainage in a Tertiary Care Hospital & Medical Research Centre, Belgaum, Karnataka

Preeti R. Bhupali*, Ramachandra S. Hooli**, Sheela Williams***

Abstract

A pre-experimental study was conducted on 55 nurses working in Intensive Thoracic Unit, Medical Intensive Care Unit & Surgical Intensive Care Unit, to assess the knowledge of nurses on nursing management of the patients with chest tube drainage & the outcome of Self Instructional Module (SIM) for nurses on nursing management of patients with chest tube drainage through knowledge scores at a tertiary care hospital & Medical Research Centre, Belgaum, Karnataka. The conceptual framework used for the study was based on Ludwig Von Bertalanffy's (1980) General System Theory.

One group pretest–posttest design, with an evaluative approach was used for the study. The structured knowledge statements consisting of 65 items with 'true' or 'false' answers were used as an instrument with non–probability, purposive sampling technique for the data collection. The data were collected through structured interview schedule. The Study findings revealed that, out of 55 nurses majority 39 (71%) scored 'Good', minimum 7 (13%) scored 'Average' and remaining 9 (16%) scored 'Poor' in the pre test. Whereas in the post test majority 43 (78%) scored 'Good' and remaining 12 (22%) scored 'Average' and none 0 (0%) were under the 'poor' category. Paired 't' test results showed statistically significant gain in knowledge with the $t_{calculated}$ (24.85*) at (p<0.001) after the administration of the SIM.

The study concluded that, overall the pre test knowledge score about the chest tube drainage was poor among the nurses. There was a need for them the SIM on nursing management of the patients with chest tube drainage. The post test results showed the improvement in the level of knowledge concluding that the SIM is an effective method for nurses to increase their level of knowledge about the chest tube drainage.

Keywords: Chest tube drainage; Critical care unit (CCU); Nurses; Nursing management; Knowledge; Self instructional module (SIM).

Introduction

Emergency care of chest trauma has progressed greatly over the past two decades. Factors contributing to this progress include changes in the system for providing emergency medical services; the spread of sophisticated methods of surgical management such as emergency room thoracotomy and thoracoscopic surgery. The vast majority of patients with chest trauma can be managed

Author Affiliation: *Lacturer, **Professor,***Professor,KLE University's Institute of Nursing Sciences, Belgaum, Karnataka,

Correspondance: Mrs. Preeti R. Bhupali, M.Sc(N),Lecturer, KLE University's Institute of Nursing Sciences, Belgaum, Karnataka.

E-mail: preetirb7@gmail.com

nonoperatively, with tube thoracostomy, pain control, chest physiotherapy, and medication. It is not unusual for pain relief or a single chest tube to improve a patient's condition dramatically.[1]

Pleural drainage with chest tube insertion for thoracic trauma is a common and often life-saving technique.[2] The evacuation of empyemas first performed centuries ago, marked the beginning of thoracic drainage. The subsequent acquisition of a greater knowledge of the anatomy, physiology, and pathology of the pleural space directed the design of thoracic catheters and drainage systems and the development of the methods by which they are used.[3]

Pleural drainage systems have been around since 1967. Back then the three bottle system was used, and today the system is a single unit.[4] The use of drain in thoracic and cardiac operations is frequent. Every year are placed more than 1 million chest tubes

in USA, and we can imagine how many drains are used worldwide per year.[5] There is no available data concerning the demographics of chest tube insertion since this is a common procedure performed in emergency rooms and surgical departments.[6]

The systems remove free air and/ or fluid from the pleural space *via* a chest tube. Once a chest tube is inserted one must make sure it is properly connected to the pleural drainage system.[4] Chest drains are a widespread intervention for patients admitted to acute respiratory or cardiothoracic surgery care areas. These are either inserted intra-operatively or as part of the conservative management of a respiratory illness or thoracic injury.[7]

The system should then be checked during routine assessments to make sure it's functioning properly.[4] Although considered a simple procedure, complication rates have been reported to be 2% to 25%.[2] Subsequent management of the Chest tube must be individualized to the patient, taking into consideration the reason for Chest tube placement, whether or not the patient has had pulmonary resection, and whether the patient is mechanically ventilated. Premature Chest tube removal, as well as unnecessary delays in Chest tube removal, leads to increased hospital stays and costs.[8] The presence of chest drains is synonymous of postoperative pain and its withdrawal is a discomfort to the patient. The pain during the removal is characterized as one of the most distressing for patients and some have reported as the worst memory during hospitalization.[5]

Nursing management of chest drains is important. A comprehensive understanding of the operations of the chest drain systems and areas requiring special attention would be important to reduce the complications arising from chest tube drainage.[9] Anecdotally there appears to be a lack of consensus among nurses on the major principles of chest drain management. Many decisions tend to be based on personal factors rather than sound clinical evidence. This inconsistency of treatment regimes, together with the lack of evidence-based nursing care, creates a general uncertainty regarding the care of patients with chest drains.[7]

Once a chest drain is inserted, it is important for the nursing staff to ensure that the patient and the drain are closely monitored. However, wide variations of practice have been observed, which are based on local policies and individual preferences rather than evidence-based protocols (Avery 2000, Charnock and Evans 2001).[9]

A prospective cohort observational study of emergency pleural drainage procedures was conducted by Department of Surgery, Royal London Hospital, London, UK, to validate the indications for pre-hospital thoracostomy and to identify complications from both pre and in-hospital thoracostomies. Data were collected over a 7 month period on all patients receiving either pre-hospital thoracostomy or emergency department tube thoracostomy. Outcome measures were appropriate indications, errors in tube placement and subsequent complications. Ninety-one chest tubes were placed into 52 patients. Sixty-five thoracostomies were performed in the field without chest tube placement. Twenty-six procedures were performed following emergency department identification of thoracic injury. Of the 65 pre-hospital thoracostomies, 40 (61%) were for appropriate indications of suspected tension pneumothorax or a low output state. The overall complication rate was 14% of which 9% were classified as major and three patients required surgical intervention. Twenty-eight (31%) chest tubes were poorly positioned and 15 (17%) of these required repositioning. Pleural drainage techniques may be complicated and have the potential to cause life-threatening injury. Pre-hospital thoracostomies have the same potential risks as in-hospital procedures and attention must be paid to insertion techniques under difficult scene conditions. In-hospital chest tube placement complication rates remain uncomfortably high, and attention must be placed on training and assessment of staff in this basic procedure.[2]

A study by School of Nursing, Dublin City University, Dublin, Ireland, aimed to identify the nurses' levels of knowledge with regard to chest drain management and identify and to ascertain how nurses keep informed about the developments related to the care of patients with chest drains. The data were collected using survey method. The results of the study revealed deficits in knowledge in a selected group of nurses and a paucity of resources. Nurse managers are encouraged to identify educational needs in this area, improve resources and the delivery of in service and web-based education and to encourage nurses to reflect upon their own knowledge deficits through portfolio use and ongoing

professional development.[7] Several service-led options exist with regard to improving knowledge in this area, such as service study days as well as ward-based tutorials. However, in an era of increasing accountability together with the impetus for each nurse to provide evidence-based care, it is crucial for individual nurse responsibility in the pursuit of knowledge in this area. Nurses must be supported by local practice development and through personal portfolio use to identify gaps in knowledge and seek appropriate training and resources.[10]

It is also important that an evidence based approach is applied to both the care of the patient and the maintenance of the drainage equipment. This understanding would help in facilitating support of the patient. In addition the nurses will also be enabled to identify and report developing problems if any at an early stage. This would reduce the risk of serious complications, and improve the arising process of the patient. The investigator during her clinical experience came across many patients with chest tube drainage and she realized, observed that nurses caring for these patient need to update their knowledge and skills sufficiently. Because many of the nurses did not know how to milk the chest tube, how to change the bottle if it is filled up or is broken, or what is to be done if the tubes are kinked, obstructed etc. The investigator felt that nursing management in this regard needs to be obviously improved.So the nurses need to have scientific knowledge and practical efficiency in caring for patients with chest tube drainage. In this way the investigator was motivated to take up this study.

Materials and Methods

A Pre-experminatal, One group pretest–posttest design, with an evaluative approach was used for the study. The independent variable of the study was the Self Instructional Module and the dependent variable was the nurse's gain in knowledge scores. The study was conducted on 55 nurses working in ITU, SICU and MICU at KLES Dr. Prabhakar Kore Hospital & Medical Research Centre, Belgaum. Non–probability, purposive sampling technique was used to collect the data. The structured interview schedule was used to collect the personal data of the samples and the structured knowledge questionnaire

consisting of 65 items with options of 'True' or 'False' are used as an instrument for the data collection. The Structured questionnaire had two sections. The section 'A' consisted of 42 items on the knowledge of chest tube drainage comprising various areas like anatomy and physiology of thoracic cavity, terminology, definition, purposes, indications, pain management, knowledge of management of a patient with chest tube drainage. Section 'B' consisted of 23 items on nursing management of chest tube drainage. The tool and the SIM were validated by experts in the fields of Nursing, Physiotherapy, Cardio-thoracic surgery, and Respiratory medicine. There was a 100 percent agreement amongst the experts regarding the items of the tool and the SIM. The reliability of the tool found was r=0.8 with Karl Person's product moment method and the reliability was r1=0.97 with Split half method: applying Spearman's Brown Prophecy formula. The pilot study confirmed the feasibility of the study. The data obtained was tabulated and analyzed in terms of objectives of the study using descriptive and inferential statistics.
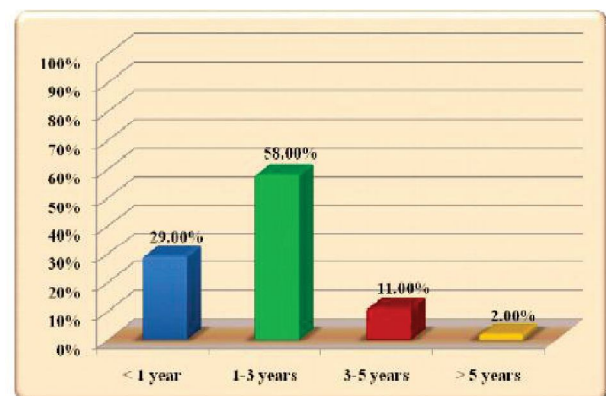
Results

The findings of the study were organized under the following headings:

Findings related to the Socio–demographic Variables of the Nurses

Majority 43 (78%) of nurses belonged to 21-24 years of age, remaining minimal 12 (22%) belonged to 25-28 years of age.

Graph I: Bargraph showing Percentage Distriution of Subjects according to Total Number of Experience

Graph II: Bargraph showing Percentage Distribution of Subjects according to Working Experience in CCU

■ 1-12 months ■ 13-24 months ■ 25-36 months ■ > 37 months
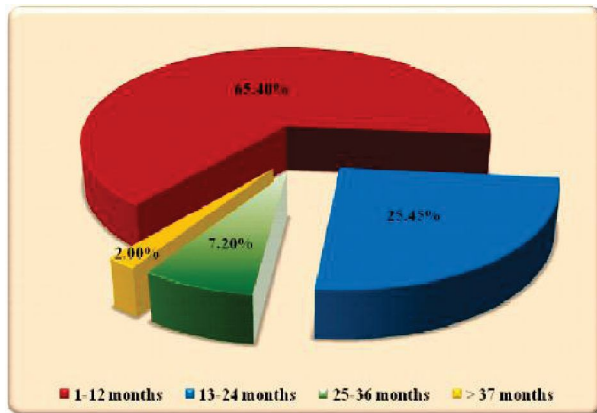
Table I: Pre-test and Post-test showing Mean, Standard Deviation, Range, Median of Knowledge Scores of Nurses on Nursing Management of Patients With Chest Tube Drainage

	Mean	Standard deviation	Range	Median
Pre-test	42.41	4.58	23	42
Post-test	51.12	4.56	20	50

Table III: Pre-test and Post-test Knowledge Scores showing Distribution of Subjects Based on Overall Gain in the Knowledge Level of the Nursing Management of Chest Tube Drainage

Knowledge level Pre-test	Pre-test		Post-test	
	f	%	f	%
Good (48-65)	9	16	43	78
Average (38-47)	39	71	12	22
Poor (<38)	7	13	0	00
Total	55	100	55	100

Majority 44 (80%) nurses were female and remaining 11 (20%) were male.

Majority 42 (76%) nurses had completed GNM course and remaining 13 (24%) nurses had completed B.Sc (N) course.

Majority 32 (58%) of nurses had 1-3 years total experience in clinical setting and minimal 1 (2%) of nurses had 5 years experience in clinical.(Graph I)

Majority 36 (65.45%) of nurses had 1-12 months of working experience in CCU, whereas minimal 1 (2%) of nurses had more than 37 months of working experience in CCU.(Graph II)

Table II: Pre-test and Post-test Knowledge Scores showing Mean Percentage Scores and Actual Gain Scores of the Subjects on Various Areas of Chest Tube Drainage

Sl. No	Areas of Knowledge	Total Score	Mean (%)		Actual gain score
			Pre-test	Post-test	
I	Section A: Knowledge of Chest Tube Drainage				
1	Anatomy and physiology of Toracic Cavity	6	65.7	84.8	19.1
2	Terminology	2	70	95.4	25.4
3	Definition	1	89	100	11
4	Purposes	3	78.7	88.4	9.7
5	Indications	2	87.2	92.7	5.5
6	Pain management	3	40.6	63	22.4
7	Knowledge of management of patient with Chest Tube Drainage	25	64	79	15
II	Section B: Nursing practice on Chest Tube Drainage				
1	Nursing management	23	64.5	73.7	9.2

Table IV: Pre-test and Post-test Knowledge Scores showing Mean, Standard Deviation and Paired 't' Test Value of the Nurses on the Nursing Management of Chest Tube Drainage

	Mean	Standard Deviation	Degree of Freedom	Paired 't'' value	n=55 Result
Pre-test	42.41	4.58			Highly significant at p<0.001 level
Post-test	57.12	4.57			
Mean Difference	8.71	2.6	54	24.85	

Findings on the Knowledge of Nurses on Nursing Management of Patients with Chest Tube Drainage

The pre-test knowledge scores revealed that, nurses had maximum (89%) knowledge scores in the area of definition, followed by (87.2%) knowledge scores in the area of indications and minimal (40.6%) in the area of pain management. It was observed that they had pre-test knowledge scores of (64.5%) on nursing management in regard to the practice on chest tube management.

The post-test knowledge scores revealed that, nurses had maximum (100%) knowledge scores in the area of definition, followed by (95.4%) knowledge scores in the area of terminology, and (92.7%) knowledge scores in the area of indications and minimal (73.7%) knowledge scores in the area of nursing management in regard to the practice on chest tube management. Thus there was a maximum (25.4%) knowledge gain in the area of terminology. The second highest (22.4%) knowledge gain was in the area of pain management. The minimum (5.5%) knowledge gain was in the area of indications. Overall there was a gain in knowledge in all the areas of chest tube drainage.(Table 1)

In the pre–test, a majority 39(71%) of the nurses had an average knowledge scores, whereas 9(16%) of them had a good knowledge scores and minimal 7 (13%) of them had a poor knowledge scores. (Mean = 42.41, Median = 42, Standard Deviation = 4.58)(Table II).

In the post–test, a majority 43(78%) of the nurses had good knowledge scores, whereas remaining all 12 (22%) of them had an average knowledge scores and none 0 (0%) of them had a poor knowledge scores. (Mean = 51.12, Median = 50, Standard Deviation = 4.56)(Table III,Graph III).

There was a significant increase in the post-test knowledge scores. The gain in knowledge score was statistically significant at p<0.001 with paired

t=24.85. Hence the research hypothesis was accepted. Therefore the findings reveal that a Self Instructional Module on nursing management of patients with chest tube drainage was effective and as such relevant to improve knowledge and proficiency of staff nurses (Table IV).

Discussion

The findings of the study were discussed under the following heads:

Findings Related to Socio-demographic Data of Nurses

The present study showed that a majority 43 (78%) of the nurses belonged to the age group of 21-24 years (who were working in ITU, SICU and MICU). This may be due to the fact that they joined the hospital soon after completing their course of study of their qualification.

In the total sample (n=55) under investigation a majority 44(80%) were females.

Majority of nurses 42 (76.3%) had completed GNM qualifications. Because nurses with GNM qualified have understanding with Hospital management to serve for two years, where as nurses with B.Sc (N) qualification have understanding to serve for one year.

Majority 32 (58%) of the nurses had total experience between 1-3 years only.

Majority 36 (65.4%) had a working experience of 1-12 months in CCU.

Findings Related to Gain in the Level of Knowledge of Nurses on Nursing Management of Patient with Chest Tube Drainage

Graph III: Bargraph showing Percentage Distribution of Subjects Overall Gain in the Levels of Knowledge of Nursing Management of Patient with Chest Tube Drainage
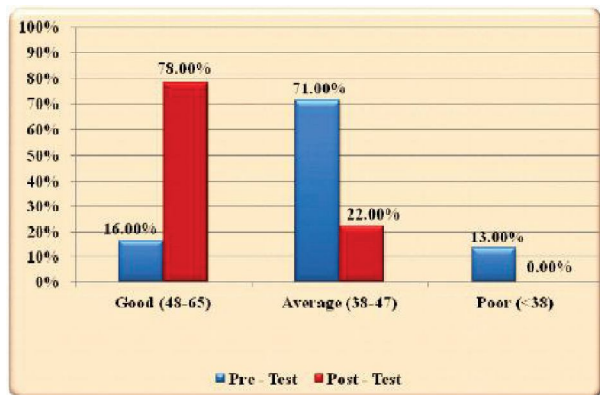
In the pre-test 7 13%) of nurses had poor knowledge level, 39 (71%) had average level and remaining 9 (16%) had good knowledge level on nursing management of patients with Chest Tube Drainage.

As compared to pre-test scores, in the post-test there was a significant increase in knowledge score. Out of 55, majority 43 (78%) belonged to 'good' category and 12 (22%) belonged to 'average' category and none belonged to 'poor' category. This could be due to the administration of SIM.

There was statistically and significantly increase in the post-test knowledge scores. The gain in knowledge score was significant at p<0.001 level and paired 't' test = 24.85. Hence the research hypothesis was accepted, as it was tested and valid.

Similar findings were found in the study by, Verma P, at Nehru Hospital, PGIMER, Chandigarh, India,[11] to assess the knowledge of the staff nurses and to determine the effectiveness of Self Instructional Module (SIM) in terms of gained knowledge regarding nursing management of patients having chest tube drainage. Subjects had poor knowledge related to clamping of chest tubes during transportation (35%), clamping during leak (28%) and about indications for chest tube removal (19%). After introduction of SIM, the scores in post-test increased significantly (p<0.001). After introduction of SIM, the number of subjects further increased to 75%, 65% and 74% respectively in these areas. The study concluded that the information given through SIM proved beneficial in improving the knowledge

and skill of 100 study subjects.

Conclusion

Based on the findings of the study, the following conclusions were drawn that, overall pre-test knowledge score was not up to the mark for the management of patients with chest tube drainge. There was a need for Self Instructional Module for nurses on nursing management of patients with Chest Tube Drainage. Post-test results showed significant improvement in the level of knowledge of Chest Tube Drainage. Thus it was concluded that Self Instructional Module was an effective method for nurses to increase their level of knowledge about Chest Tube Drainage.

References

1.   Mashiko K, Henmi H, Otsuka T. Recent advances in the management of chest trauma. *Nihon Kyobu Shikkan Gakkai Zasshi*. 1994; 32(Suppl) :44-9.

2.   Aylwin CJ, Brohi K, Davies GD, Walsh MS. Pre-hospital and in-hospital thoracostomy: indications and complications. *Ann R Coll Surg Engl*. 2008; 90(1): 54-7.

3.   Edward R Munnell. Thoracic Drainage. *Ann Thorac Surg*. 1997; 63: 1497-1502.

4.   Chest tubes and pleural drainage systems. Available from URL:http://respiratorytherapycave.blogspot.in/2011/10/chest-tubes-and-pleural-drainage.html.

5.   Altair Costa Jr, Luiz Leão, Marcel Sandrini, Caio Mata, Eduardo Leão, Ricardo Santos. Chest tube Removal with or without local anesthesia - a prospective randomized clinical study. Which one is the best method? The international society for minimally invasive cardiothoracic surgery. *(ISMICS)*. 2011: 72.

6.   Cancer / Chest Tube Insertion. Available from URL:http://www.surgery.com/procedure/chest-tube-insertion/demographics.

7.   Lehwaldt D, Timmins F. The need for nurses to have in service education to provide the best care for clients with chest drains. *J Nurs Manag*. 2007; 15(2): 142-8.

8.   Chest tube management. Department of Surgical Education, Orlando Regional Medical Center.

Available from URL:http://
www.surgicalcriticalcare.net/Guidelines/
chest_tube_2009.pdf.

9.   Ms Maggie Lit. Nursing Management of Chest
Drains. Department of Medicine, Queen Elizabeth
Hospital. Hong Kong Respiratory Medicine. 2009
Dec. Available from URL:http://www.hkresp.com/
index.php/administrator/152-pleural-diseases/578-
2009-dec-nursing-management-of-chest-drains.

10.   Lehwaldt D, Timmins F. The need for nurses to have
in service education to provide the best care for
clients with chest drains. *J Nurs Manag.* 2007;
15(2): 142-8.

11.   Verma P. Impact of self instructional module for the
nurses on nursing management of the patients
having chest tube drainage. *Nurs J India.* 2003;
94(2): 33-4.