chest drain management among nurses. The sample consisted of 121 critical care and ward nurses from a large urban paediatric hospital, who cared for chest drains on a regular basis. Data were collected using a 37-item. The findings demonstrate that increased exposure to caring for children with chest drains is synonymous with a greater perception of knowledge levels in this area of practice. While critical care nurses looked after children with chest drains more frequently than ward nurses, there was no difference in the knowledge assessment section of the questionnaire. This research identified where knowledge deficits exist [8].

An article written on "Chest tube care" emphasized that in chest tube drainage management, at least every 2 hours should document a comprehensive pulmonary assessment including respiratory rate, work of breathing, breath sounds and arterial oxyhemoglobin saturation measured by pulse oxymetry. All tubings should be kept below the level of patient's chest. Check tidaling in the water seal chamber with respiratory effort is normal intermittent bubbling corresponding to respirations in the water seal chamber indicates air leak from the pleural space. If bubbling continues in the water seal chamber indicates leakage of the system. [9].

Durai R, Hoqne H, Tony W. (2010) in an article on "managing a chest tube and drainage system' suggested that chest tubes are inserted to drain of air, blood, pus or lymph pleural cavity. During transport, the chest tube container should be below the level of patients chest and its clamping should be avoided. A nurse should responsible to manage the system, after the chest tube is inserted. This entails the monitoring of the chest tube position, controlling fluid evacuation, changing and emptying the containers and caring during transport. All nurses in this field should be perfect, as the tube insertion can cause complications like bleeding, pain, internal organ damage and death [10].

Rajan C.S. (2010) an article written on "Tube Thoracostomy Management" Suggested to teach the client to splint a thoracic incision if indicated, provide analgesic before these maneuvers if needed, assess his pain using a pain intensity rating scale to encourage him for cough and coach in deep breathing to promote drainage and lung expansion[11].

Maggie P. et al (2010) conducted a study on "to assess nurses knowledge level regarding the chest drain management on 108 staff nurses." Out of 108 staff nurses, 78.2% were registered nurses, 12.9% nurses were Nursing officer and Advanced Practice Nurses. 64.35% were having at least 5 years' medical experience. Study showed that there was poor knowledge regarding milking chest drain, aspects of suction levels, clamping of chest drains and types of chest drainage system and concluded the urgency to educate nurses in chest drains care to improve for improvement. [12]

4. Studied Related to Complication of Chest Tube Drainage

Goltz J. et al (2011) an article written on "Iatrogenic perforation of the left heart during placement of a chest drain" emphasized a case of a 88 year old male patient suffering from chronic heart failure. Because of dyspnea, an attempt was made to drain the left pleural cavity, a malposition of the chest drain was suspected as blood was draining from the catheter. The hemodynamically stable patient was referred for tomography of the chest. The drain had perforated the left ventricle, run through the mitral valve and exited the left atrium via a pulmonary vein ending in middle lobe. A left anterolateral thoracotomy was performed and drain was extracted successfully [13].

Harris A. et al (2010) study was conducted on major complications of intercostals chest drain insertion in UK. Among 198 chest physicians. A questionnaire was sent at 148 acute hospital trusts enquiring about current practice and adverse incidents related to chest drains. Result showed that out of 148, 101 trust replied, 67 reported at least on major incident involving ICD insertion such as haemorrhage, infection lung re expansion and pulmonary edema, 31 cases of ICD misplacement with 7 deaths and 47 cases of serious lung or chest was injuries with 8 deaths, and 6 cases of ICD placement on wrong side with 2 deaths were reported. The survey raised the importance of training health care staff regarding care of patient with chest tube drainage [14].

Shallis S. et al (2009) conducted a study on chest tube-related complications and their management, to define problems with current paradigms for chest drainage among the north American cardiothoracic surgeons and speciality cardiac surgeory nurses. All 108 sample responded. It showed that clogging leading to dysfunction was a major concern while choosing tube size. All 106 surgeons observed chest tube clogging 93 of 106 reported adverse patient outcomes. 51 % surgeons were not satisfied with available tubes and procedures to avoid tube occlusion. Some even forbid the stripping maneuver for fear of more bleeding by negative pressure generated. Results highlight the frequent problems of clogging with current postsurgical chest drainage systems, and suggest need of solutions to avoid clogging complications, overcome clinician concern and patient pain [15]

Altershihi M, KhamashF, Ibrahim A. (2008) in a study describe possible complications of thoracotomy tube insertion and common pitfalls in underwater seal system management. study sample was 224 patients with 339 tubes insertions at the king Hussain medical center. Complications and mistakes in thoracotomy tube insertion were analyzed. Results showed the most common complications were lung injury followed by intercostals injury and the improper handling of negative suction system connected to the chest bottle. So, all physicians in surgical field and nurses should have special courses in chest tube management and care [16].

Aylwin C.J. et al (2008) prospective cohort observational study was done about indications and complications of pre-hospital and in-hospital thoracotomy (chest tube management). Data were collected over a 7-month period on all patients receiving either pre-hospital thoracotomy or emergency department tube thoracotomy. It was found that 91 chest tubes were placed into 52 patients. 65 thoracotomies were performed in the field without chest tube placement. 26 procedures were performed in emergency department

following identification of thoracic injury. Of the 65 pre-hospital thoracotomies, 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 3 patients required surgical intervention. 28 (31%) chest tubes were poorly positioned and 15 (17%) of these required repositioning. 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 [17].

5. Studies Related to the Effectiveness of Planned Teaching

Kadam,A.*(2014*) found that Structured education programme was highly effective to improve the knowledge score and to improve the attitude score of subjects/ caregiver towards colostomy care of patient [18]. Anjum,S.(2014)conducted study to assess knowledge of contraceptives methods and appraisal of health education among married women and concluded After the health education married women knowledge was improved to 100% about female sterilization followed by condom 99%, skin implants 86%, oral pills 85% and emergency contraceptives 85%.Sociodemographic variable were significantly associated with existing knowledge and level of married women specially age at marriage, age at first child, occupation,, income ,education [19][20]. Babu, R. L. (2014) The findings of the study concluded that care takers had inadequate knowledge regarding non-curative care of terminally ill cancer patients. The planned education programme on non-curative care of terminally ill cancer patients was highly effective in improving the knowledge of care takers regarding non-curative care of terminally ill cancer patients.[21] Shinde,M.(2014) concluded that demonstration regarding feeding of hemiplegic patient among caregivers was effective in increasing the skill of the caregivers regarding feeding of hemiplegic patient [22].

6. Objectives of the Study

1. To assess the existing knowledge of staff nurses regarding care of patients with chest tube drainage.
2. To assess the efficacy of planned teaching regarding care of the patients with chest tube drainage among staff nurses.
3. To find the association between the pre-test and post test knowledge of staff nurses with selected demographic variables.

Hypothesis

- H0- There will be no significant difference between the mean pre test and post test knowledge score of staff nurses regarding care of patients with chest tube drainage as evidenced from the structured knowledge test at $p< 0.005$ level of significance.
- H_1**:** The mean post test knowledge scores of staff nurses regarding chest tube drainage will be significantly higher than their mean pre test knowledge scores as evidence from structured knowledge test $P< 0.05$ level of significance.

7. Methodology

- **Research approach:** Descriptive evaluatory approach
- **Research design:** One group pre test and post test design
- **Setting of the study**: Selected hospitals in Maharashtra, India.
- **Sample and sample size:** The sample consists of registered staff nurses working in selected hospitals, in Maharashtra, who were available at the time of data collection and also who fulfilled the inclusion criteria. Sample size was 50.
- **Sampling technique:** Non probability convenient sampling technique was used to select the sample.

Sampling criteria
Inclusive criteria

- Nurses who were willing to participate in the study.
- Nurses who were working in ICU & cardio thoracic wards
- Nurses who were present at the time of study

Exclusive criteria

- Nurses who were working in General OT, Outpatient department and Labour room.
- The persons who had already participated in such kind of study.

Data Collection Tool

Self administered structured knowledge questionnaire was used.

Data Collection Procedure

After taking all formal permissions, 50 samples were selected as per criteria. Pre test was given using structured knowledge questionnaire. After pretest planned teaching was conducted. Post test was conducted on 7th day after planned teaching.

8. Results

Table No.I: Comparison of pre test and post test knowledge score of staff nurses regarding care of the patient with chest tube drainage, **N=50**

Area	Pre test		Post test	
	Mean	%	Mean	%
Anatomy and Physiology	2.54	63%	3.30	82%
Principles	1.70	56%	2.20	73%
Indications and purposes	2.44	48%	3.78	75%
Procedure	1.62	40%	3.14	78%
Nursing management of patients	6.62	55%	10.26	85%
Removal	2.84	47%	4.78	79%
Complications	0.42	42.%	0.78	78%
P<0.0001, Significant				

Data presented in table 1 depicts that staff nurses are having highest mean percentage gain in knowledge, i.e. 38% in area of procedure of chest tube drainage, lowest gain in principles of chest tube drainage 16.67%, 19% mean gain in anatomy and physiology, 26.8% mean gain in indications and purposes, 30.34% mean gain in nursing management of

patients, 32.33 % mean gain in removal and 36% mean gain in complications of chest tube drainage. In addition the calculated 'p' values for all areas of knowledge regarding cardiac rehabilitation was P<0.0001 which was much less than the acceptable level of significance i.e,'p'=0.05.

Table 2: Significance of difference between area wise knowledge score in pre and post test of staff nurses in relation to knowledge regarding care of patient with chest tube drainage, N=50

Area	Pre test		Post test		Z-value	p-value
	Mean %	SD	Mean %	SD		
Anatomy and Physiology	63%	0.90	82%	0.54	5.16	,p<0.05
Principles	56%	0.76	73%	0.72	3.83	p<0.05
Indications and purposes	48%	1.10	75%	0.70	6.94	p<0.05
Procedure	40%	0.90	78%	0.72	10.80	p<0.05
Nursing management of patients	55%	2.30	85%	0.94	10.70	p<0.05
Removal	47%	1.07	79%	0.64	10.80	p<0.05
Complications	42%	0.49	78%	0.41	3.84	,p<0.05

The above table shows that the calculated 'Z' value are much higher than the tabulated value(1.96) which is statistically acceptable level of significance. In addition 'p' values for all the areas of knowledge regarding care of the patients with chest tube drainage was less than 0.005, which is the level of significance. Hence it is statistically interpreted that the planned teaching regarding care of the patients with chest tube drainage was effective in improving the knowledge of staff nurses.

Table 3: Comparison of knowledge score in pre test and post test, N =50

Level of knowledge score	Knowledge score	
	Pre test	Post test
Poor(<50%)	20(40%)	0(0%)
Good(51-75%)	30(60%)	7(14%)
Excellent(>75%)	0(00%)	43(86%)
Minimum score	8	25
Maximum score	25	31
Mean score	18.18±3.89	28.24±1.40

The above table shows that in pre test 30(60%) of staff nurses were having good knowledge and 40% of them were having satisfactory level of knowledge score, whereas in post test 7(14%) of staff nurses were having good knowledge and 86% of them had excellent level of knowledge.

9. Conclusion

The study concludes that planned teaching on care of patient with chest tube drainage was found to be effective in increasing the knowledge of staff nurses. Staff nurses had a significant gain in knowledge regarding care of patient with chest tube drainage. The written prepared material by the investigator in the form of planned teaching helped the nurses to improve their knowledge on care of patient with chest tube drainage.

10. Implications of the Study

The findings of this study have implications for nursing practice, nursing education, nursing administration and nursing research

Nursing Practice

In the management of patient with chest tube drainage nurse plays a vital role. The study reveals that nurses have lack of knowledge in providing care to the patient with chest tube drainage. The study findings can be used to bring about awareness among the head nurses regarding the need for developing a standard protocol for nursing care regarding care of patient with chest drain. The head nurses can also develop a clinical teaching programme for the nurses regarding the care of patient with chest tube drainage.

Nursing Education

Health care personnel should be given an opportunity to update their knowledge periodically. The educators need to remember that more emphasis is to be given for care of patient with chest tube drainage. Educators will help students, colleagues, and junior staff to be trained in chest tube drainage management. In the present nursing curriculum now a day much emphasis is given on comprehensive care. So the study will help the teachers to educate the student and the staff nurses for increasing the knowledge about chest tube drainage management. The Planned teaching could help educator to use it as a tool for teaching.

Nursing Administration

Nursing is a dynamic profession, and staff development is an integral part of nursing administration. Findings of the study can be used by the Nursing Administrators in creating policies and plans for providing education to the staff nurses and care takers. Necessary administrative support should be provided for preparing educational materials for various nursing procedure. It will help the nursing administrators to be planned and organized and in giving continuing education to nurses and others and for applying and updating the knowledge on care of patient with chest tube drainage.

Nursing Research

The findings of the study have added to the existing body of the knowledge in the care of patient with chest tube drainage. Other researchers may utilize the suggestions and recommendations for conducting further study. The tool and technique used has added to the body of knowledge and can be used for further references.

11. Personal Experience

The entire study gave an enriching experience to the investigator. It helped her to develop her skill in critical thinking and analysis and realize the importance of effective communication with respondents. The entire study was varied and rich learning experience which enabled the investigator to develop her skill in dealing with different

personalities. The concept clarity about research as a whole increased. At every stage, the investigator received guidance and support from her guide. This boosted confidence to go ahead and carry out the planned activities and the co-operation from study subject was remarkable. The research was a great learning opportunity for the investigator.

12. Recommendations

On the basis of the findings of the study, it is recommended that the following studies can be conducted.

- A similar study can be replicated on a larger population.
- A similar study can be done to assess the practice of care of patient with chest tube drainage. Among staff nurses.
- A comparative study can be done on the knowledge and practices of nurses working in government hospitals versus private hospitals in providing care to the patient with chest tube drainage among staff nurses.
- An exploratory study to find out the factors that hinder the nurses in providing care for patients with chest tube drainage among staff nurses.
- An exploratory study to find out the difficulties experienced by the nurses in providing care to the patient with chest tube drainage.
- A comparative study to find out the effect of different teaching methods in improvement of knowledge and practice of nurses regarding care of patient with chest tube drainage.

References

[1] Lehwaldt D. The need for nurses to have in service education to provide the best care for clients with chest drains. Journal of Nursing Management. 2007 Mar; 15(2):142-8.
[2] Larry R, Kaiser. Mastery of cardiothoracic surgery. 3rd edition. Lippincot Williams and wilkins. 2004; 280-283.
[3] Laura D. Guidelines for the Insertion and Management of Chest Drains. 2009 January; Page 3-4. Retrived from: http://www.dbh.nhs.uk.
[4] Blank-Ried, Cynthic A. Taking the tension out of traumatic pneumothoraxes. Nursing journal. 2001 April; volume 29:41.
[5] www.emedicine.medscape.com.Nursing management of chest tube drainage system.
[6] Shinde, M., & Anjum, S. (2007). Educational Methods and Media For Teaching In Practice Of Nursing. *Sneha Publication India (Dombivili)*.
[7] SHINDE, M., & ANJUM, S. (2007). Introduction to Research In Nursing. Sneha Publication India (Dombivili).
[8] Magner C, Houghton C, Craig M, Cowman S. Nurses knowledge of chest drain management in an Irish Children's Hospital. Journal of Clinical Nursing. 2013
[9] Bauman M, Handley C. Chest-tube care: The more you know the easier it. American Nurse Today. 2011; Volume 6 (9):29.
[10] Durai R, Hoque H, Tony w. Managing a Chest Tube and Drainage System. AORN Journal. 2010 February; 91: 275-280. Retrived from: www.aornjournal.org.
[11] Rajan Clement Shirodkar. Tube Thoracostomy Management. Medscape article. 2010 May. Retrived from: http://emedicine.medscape.com/article/1503275-overview
[12] Maggie P, Lit K, Han L, Wing H, Wai M, Johnny C. The need for nurses to have an in-service education of chest drain management. Chest Journal. 2010 October; Volume 138(4).
[13] Goltz J, Gorski A, Bohler J, Kickuth R, Hahn D. Christian Oliver Ritter. Iatrogenic perforation of the left heart during placement of a chest drain. Diagnostic and Interventional Radiology. 2011 September; volume 17:229–231.
[14] Harris A, Ronan B, Driscoll O, Peter M. Tarkington Survey of major complications of intercostals chest drain insertion in the UK. Postgraduate Medical Journal. 2010; volume 86:68-72.
[15] Shalli S, Saeed D, Fukamachi K, Gillinov A.M, Cohn W.E, Perrault L.P, Boyle E.M. Chest tube selection in cardiac and thoracic surgery: a survey of chest tube-related complications and their management. Journal of Cardiac Surgery. 2009; volume 24(5):503–509. Available from: http://www.ncbi.0284nlm.nih.gov/pubmed/1974
[16] Altarshihi M, Khamash F, Ibrahim A. Thoracostomy tube complications and pitfalls: An experience at a tertiary level military hospital. Rawal Medical Journal. 2008; volume 33(2):141–144.
[17] Aylwin C. et al Pre-hospital and in- hospital thoracostomy: indications and complications.Annals of The Royal College of Surgeons of England.2008 Jan: 90(1):54-57.
[18] Kadam, A., & Shinde, M. B. (2014). Effectiveness of Structured Education on Caregiver's Knowledge and Attitude Regarding Colostomy Care. *International Journal of Science and Research (IJSR)*, *3*(4), 586-593. www.ijsr.net
[19] Anjum, S., Durgawale, P. M., & Shinde, M. (2014). Epidemiological Correlates of Use of Contraceptives Methods and Appraisal of Health Education on Status of Knowledge and Practices among Married Woman. *International Journal of Science and Research (IJSR)*, *3*(2), 203-210. www.ijsr.net
[20] Anjum, S., Durgawale, P. M., & Shinde, M. (2014). Knowledge of Contraceptives Methods and Appraisal of Health Education among Married Woman. *International Journal of Science and Research (IJSR)*, *3*(3), 584-590. www.ijsr.net
[21] Babu, R. L., Mali, N., & Shinde, M. (2014). Effectiveness of Planned Teaching Programme on Knowledge Regarding Non-Curative Care of Terminally ILL Cancer Patients among Care Takers. *International Journal of Science and Research (IJSR)*, *3*(4), 198-205. www.ijsr.net
[22] Shinde, M., & Anjum, S. (2014). Effectiveness of Demonstration Regarding Feeding of Hemiplegia Patient among Caregivers. *International Journal of Science and Research (IJSR)*, *3*(3), 19-27.

Author Profile

Vaishali Sukhdeorao is Final Year M.Sc Nursing Student, Kasturba Nursing College, Sevagram india

Mrs.Ancy Ramesh is Professor Cum Vice Principal, Kasturba Nursing College, Sevagram india

Mrs.Vidya Sahare is working as Associate Professor Kasturba Nursing College Sevagram