"A Study to Assess the Effectiveness of Self Instructional Module on Knowledge and Demonstration on Skill Regarding Care of Chest Tube Drainage among Staff Nurses at Skims Hospital Soura Srinagar Kashmir"

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Background& Objectives
A chest tube insertion is a surgical procedure in which a hollow, flexible drainage tube is inserted through the side of the chest in to the pleural space in order to drain the pleural cavity of air, blood, pus or lymph. Chest trauma produces 25% of traumatic deaths; these injuries contribute up to 50% of global mortality caused by trauma. Chest trauma is commonly associated with multiple organ damage that favor catastrophic patient outcome, approximately, 16,000 deaths per year in India alone are a result of chest trauma. Inspite of high mortality rate, 90% of patients with life threatening thoracic injuries can be managed by a simple intervention like drainage of pleural space by tube thoracostomy. Inefficient nursing care of chest drains may be associated with unacceptable and sometimes life-threatening complications.
The study was conducted with the aim to assess the effectiveness of Self-instructional module on knowledge and demonstration on skill regarding care of chest tube drainage among staff nurses and to determine association between pre-test knowledge scores among staff nurses with their demographic variables (gender, professional qualification and years of working experience) at SKIMS, Hospital Soura Srinagar.
Methodology
Quantitative research approach with pre-experimental one group pre-test post-test design was used to assess the knowledge and skill of 50 staff nurses at SKIMS Hospital Soura Srinagar Kashmir. Purposive sampling technique was used to select subjects who fulfilled the inclusion criteria. Data was collected using Structured knowledge questionnaire and Observation checklist. Intervention was given in the form of self-instructional module on knowledge and demonstration on skill regarding care of chest tube drainage. Data was analyzed using descriptive and inferential statistics.
Results
The results of the study revealed that the post-test (Mean ±SD) knowledge score of the study subjects was (25.18.12±2.274) which is significantly higher than the mean pre-test knowledge score of study subjects (15.88±4.443) with mean difference of knowledge (9.300) regarding care of chest tube drainage The mean difference was statistically significant (p<0.001). The post-test (Mean ±SD) skill score of the study subjects was (25.18.12±2.274) which is significantly higher than the mean pre-test skill score of study subjects (2.98.±2.646) with mean difference of skill (6.740) regarding care of chest tube drainage The mean difference was statistically significant(p<0.001).
The above findings indicate that the 'Self-instructional module was effective in increasing the knowledge and skill score of staff nurses regarding care of chest tube drainage.
The results also revealed that there was significant association between the professional qualification and years of working experience of the study subjects with the pre-test knowledge and skill scores. Further, there was no significant association between selected demographic variable i.e. Gender, of study subjects with their pre-test Knowledge and skill scores.
Conclusion
The findings of the study concluded that in the pre-test most of the study subjects had poor knowledge and skill, while as in the post-test most of the subjects had good level of knowledge and skill indicating that the Self Instructional module was effective in improving the knowledge and skill scores.
The study concluded that there was statistically significant improvement in knowledge and skill scores after implementation of self-instructional module and demonstration regarding care of chest tube drainage indicating that the self-instructional module and demonstration was effective in improving the knowledge and skill scores.
The study recommended that regular continuous educational program should be designed to give information about chest tube for enhancing and reinforcement of nurses' knowledge to achieve high quality care.

I. Background of the Study

The lungs are paired organs situated in the thoracic cavity that performs respiration. Although respiratory disease is often thought of as only lung problem, the malfunction of any component in the thoracic cavity can cause respiratory dysfunction. For example if hemothorax occurred as result of chest trauma or any thoracic surgery will lead to an increase in the intrapleural pressure and results in respiratory dysfunction. The important management for this condition is chest tube drainage. The purpose of chest tube drainage is to remove the excess air, fluid or pus from the pleural space and to restore normal intra pleural pressure, so that the lungs can re-expand.Lungs plays a crucial role in delivering oxygen to the cells of our body. The cells of our body require a continuous supply of oxygen, without this oxygen we would die within minutes. Every day we breathe about 20,000 times. All of this breathing couldn't happen without help from the lungs. Therefore, the function of our lungs is vital for a healthy and productive life. Conditions affecting the thoracic cavity range from acute problems to long term chronic disorders. Many of these disorders are serious and often life threatening. Supporting the structure and function of the heart and lungs is a matter of life.[1,2,3,4]

A chest tube insertion is a surgical procedure in which a hollow, flexible drainage tube is inserted through the side of the chest in to the pleural space in order to drain the pleural cavity of air, blood, pus or lymph. The water seal container connected to the chest tube allows one-waymovement of air and fluid from the pleural cavity. The chest tube is used to restore the intra-pleural pressure and to prevent the collapse of lungs. Chest tube management includes the actions to keep the tube functioning properly, which is the prime role of nurses while caring of patients with chest tube drainage.[5]

The common indications of chest tube drainage are pneumothorax (accumulation of air in the pleural space), pleural effusion (accumulation of fluid in the pleural space), chylothorax (collection of lymphatic fluid in the pleural space), and empyema (a pyogenic infection of the pleural space), hemothorax (accumulation of serous fluid in the pleural space). In addition to these cardiothoracic surgeries and chest trauma are common indications of chest tube insertion.[6,7,8]

On a global scale every minute nine people die from traumatic injuries; approximately 5.8 million people die every year from non-intentional traumatic injuries[9,10,11].

Chest trauma can cause severe acute pulmonary dysfunction due to hemo or pneumothorax, rib fractures and lung contusion.

Chest trauma produces 25% of traumatic deaths; these injuries contribute up to 50% of global mortality caused by trauma. Chest trauma is commonly associated with multiple organ damage that favor catastrophic patient outcome, approximately, 16,000 deathsper year in India alone are a result of chest traumaand many deaths can be prevented by prompt diagnosis and correct management.[7]Inspite of high mortality rate, 90% of patients with life threatening thoracic injuries can be managed by a simple intervention like drainage of pleural space by tube thoracostomy.[12]

Using chest tubes and chest tube drainage units is a complex and critical nursing function. By learning about their components and techniques needed to use them, nurses can protect patients and help them recover from a serious pulmonary problem.[13]

Most of the nurses working in an acute care setting will encounter patients with chest drains at some point in their careers. So even the non-specialist nurse requires a good working knowledge of chest drain system.It is fundamental that the nursing professionals should know the materials used in the chest tube drainage as well as their maintenance.[14].

II. Review of Literature:

A literature review is an organized written presentation of what has been published on a topic by scholars. The review of literature is an important study in any aspect of research because it gives deeper insight into the problem area. It helps the researcher to find out what is already known, what others have attempted to find out and what problems remain to be solved. It forms the foundation upon which all future work will be built[16].

The review of literature for the present study has been organized and presented under following headings:

1. Studies related to the incidence and prevalence of chest tube drainage insertion
2. Studies related to complications of chest tube drainage
3. Studies related to the knowledge of staff nurses regarding care of chest tube drainage.

4. Studies related to effectiveness of Self-instructional module on knowledge regarding care of chest tube drainage.
5. Studies related to skill regarding care of chest tube drainage.

1. Studies related to the incidence and prevalence of chest tube drainage insertion

A retrospective study conducted by Prem Prakash Sharma, AtulJhanwar, Deeksha Sharma, Subhkaran Sharma[19] in 2015 to assess the prevalence of chest injury patients at Geetanjali medical college and hospital Udaipur. Clinical details of the patients were recorded from their case sheets and were analyzed with reference to their age, sex, mode of injury, severity of injury, treatment employed, complication and final outcome etc. Results revealed that males were predominantly involved (88.2%). Majority (61.9%) were in the age group of 21-30 years. Study concluded that Chest injury occurs in a significant number of trauma patients and commonly affected victims are males of 20-40 years age. The majority of these patients were managed by simple intervention i.e., chest tube drainage and non –invasive ventilation, only less than 3% require thoracotomy.

A retrospective study conducted by Johny WM Chan, et, al[20] in 2009on management of patients with pneumothorax. The study included all adult patients admitted as an emergency in 12 public hospitals with a discharge diagnosis of pneumothorax. Altogether these patients had 1091 episodes (476 primary spontaneous pneumothorces, 483 secondary spontaneous pneumothoraces, 87 iatrogenic pneumothorces and 45 traumatic pneumothoraces). Conservative treatment was offered in 182 (17%) episodes, which were more common among patients with small primary spontaneous pneumothoraces (71%).Simple aspiration was performed to treat 122 (11%) of such episodes and had a success rate of 15%. Intercostal tube drainage was employed in (82%) episodes with success rate of 77%.

A prospective study conducted by PreetamRajgopal Acharya and Kusum V. Shah[21] in 2007 on 40 consecutive patients with empyema thoraces admitted to the tuberculosis and chest diseases ward of a teaching hospital. The result reported that two patients received antibiotics with repeated thoracentesis only, intercostal chest tube drainage was required in 38 cases (95%) and more aggressive surgery was performed on 2 patients. The average duration for which the chest tube was kept in the complete expansion cases was 22.3 days.

2. Studies related to complications of chest tube drainage

A retrospective study conducted by Kong VY, Clarke DL[22] in 2014 to assess the spectrum of visceral injuries secondary to misplaced intercostal chest drains with 53 consecutive patients over a insertion seven year period in a high volume trauma service in South Africa. Results revealed that a total of 53 intercostal drains were inserted in 53 patients, 58 organ injuries occurred in 53 patients. 92% (49/53) of patients sustained a single organ injury and 4 sustained multiple injuries. The three most common injuries were: diaphragm (36%, 21/53), gastric (22%, 13/53), and pulmonary (12%, 7/53). Other injuries were: 6 (10%) spleen, 4 (7%) liver, 2 (3%) colon and 1 (2%) kidney. Three (5%) sustained an injury to the intercostal artery and one (2%) sustained a pulmonary artery injury. 39 patients (74%) required operative interventions which included laparoscopy: 20 (51%), laparotomy: 8 (21%), thoracotomy: 8 (21%).A total of 28 patients (53%) developed further complications: 13 wound sepsis, 7 pneumonia, 6 empyema,
2ARDS. and 15% (8/53) required intensive care admission.

A retrospective review of ICD complications conducted by Kong VY, Oosthuizen GV, Sartorius B, Keene C, Clarke DL[23] in 2013 a major trauma service in South Africa over a four-year period from January 2010 to December 2013. A total of 1,050 inter costal drains were inserted in 1,006 patients, of which 91% were male. The median patient age was 24 years. There were 962 patients with unilateral intercostal drains and 44 with bilateral inter costal drains. Overall, 203 ICDs (19%) were associated with complications: 18% (36/203) were kinked, 18% (36/203) were inserted subcutaneously, 13% (27/203) were too shallow and in 7% (14/203) there was inadequate fixation resulting in dislodgement. Four patients (2%) sustained visceral injuries and two sustained vascular injuries. Forty-one per cent (83/203) were inserted outside the 'triangle of safety' but without visceral or vascular injuries. One patient had the ICD inserted on the wrong side. Study concluded ICD insertion is associated with a high rate of complications.

A study conducted by Goltz J. et al[24] in 2011on "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.

A study was conducted Harris A. et al[25] in 2010on major complications of intercostal 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 inter costal drain insertion such as hemorrhage, infection lung re expansion and pulmonary edema, 31 cases of inter costal drain misplacement with 7 deaths and 47 cases of serious lung or chest was injuries with 8 deaths, and 6 cases of inter costal drain 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.

A national survey conducted by Ann Harris, B Ronan O' Driscoll, Peter M[26]inTurkington2010(among chest physicians of their experience of harm associated with intercostal drainage (ICD) was conducted in UK. A questionnaire was sent to 198 UK chest physicians at 148 acute hospital trusts, enquiring about current practice and any adverse incidents related to chest drains from 2003 to 2008 101. Of 148 trusts (68%) replied. 67 trusts reported at least one major incident involving intercostal drain insertion. 31 Cases of intercostal drain misplacement were reported with seven deaths. Misplaced drains were inserted in liver (10), peritoneal space (6), heart (5), spleen (5), subclavian vessels (2), colon (1), oesophagus (1) and inferior vena cava (1). 47 cases of serious lung or chest wall injuries with eight deaths and six cases of inter costal drain placement on the wrong side with two deaths were reported. The study concluded that 67% of responding trusts had encountered major complications of intercostal drain.

A study conducted in 2009 by Martiz D, Wallis L, Hardcastle T[27]at Tygerberg Hospital in the Cape Town metro pole with an aim to determine the complications and errors commonly encountered during the placement of inter costal drains for trauma. The audit ran for the 3-month period 1 January to 31 March 2008, included all patients with chest trauma referred to the TBH trauma unit with an inter costal drain in situ, and patients with chest trauma in whom an intercostal drain had been placed by trauma unit staff were included in the study. A total of 3989 patients with trauma injuries were seen in the front room trauma bay during the study period. The study concluded that an overall complication rate of 9.5% was seen. Insertional complications numbered 7 (27%), with 19 (73%) positional complications.

A study conducted by Shallis S. et al[28] in 2009 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 surgery 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.

A study Conducted by Altershihi M, Khamash F, Ibrahim A[29] in 2008 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 intercostal 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.

A prospective cohort observational study conducted by Aylwin C.J. et al[30] in 2008 to assess 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. 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.

A prospective study conducted by Remerand, Francis MD, LuceVirgina, BadachiYasmina, Rouby, Jean-Jacques[31] in 2007 to assess the incidence of chest tube malposition's in critically ill. The study comprises of 122 chest tubes percutaneously inserted in 75 consecutive critically ill patients. Malposition was detected in 30% of percutaneously inserted chest tubes, Twenty-two chest tubes were diagnosed as being intrafissural (21%), and 10 were diagnosed as being intraparenchymal (9%). Avoiding the use of a trocar may reduce significantly the incidence of chest tube malposition.

A retrospective study conducted by Ball CG, Lord J, Kevin B, Scott G more, Robert H, Alex K Ng[32] in 2007on chest tube complications over a period of 12 months at a regional trauma center. The researcher retrospectively received all severely injured trauma patients who underwent tube thoracostomy. Insertional, positional and infective complications were identified. Thoracoabdominal CT scans and corresponding chest x

rays were also used to determine the rate of complications. Of the patients, 338 (44%) had chest X-ray (CXR) and computed tomography (CT) imaging. there were 17 complications; 6 (35%) were insertional; 9 (53%) were positional and 2 (12%) were infective.

3. Studies related to the knowledge of staff nurses regarding care of chest tube drainage.

A descriptive study conducted by Badria A. Elfaki, Hassanat E. Mustafa, Alaadin Hassan Ahmed[33] in 2016 to assess nurses knowledge and practice among (50) nurses employed in Sudan Heart Centre hospital. The aim of study was to assess nurses' knowledge and practice for patient connected to chest drain. The study reflected majority 35/50 nurses were females. All nurses were known chest drain is sterile procedure, and more than 60.0% were known the chest drain needs inform consent, indications and site of insertion. Although more than 60% of them didn't know exactly underwater-seal, position of patient during insertion the tube, routine milking or striping will increase pleural pressure and mobility of patient with chest drain. Also nurses had average knowledge about the basic principles of drain function, complications, actions when tubes leakage, displacement or dislodge. The nurses with master degree and experience more than 5 years had significant high knowledge than those with bachelor degree and experience from 1-5years (P-value < 0.05). Majority of nurses demonstrated poor level of practice towards preparation of equipment for insertion the chest drains and routine patient care. The study concluded nurses were demonstrated deficit in knowledge and practice.

A cross-sectional study conducted by Kesieme EB, Essu IS, Arekhandia BJ, Welcker K, Prisadov G[34] in 2016 aimed to ascertain the level of knowledge of care of chest drains among 50 nurses working in wards in a teaching hospital in Nigeria. The majority were respondents aged between 31 and 40 years (45.4%) and those who have nursing experience between 6 and 10 years. Only 37 respondents (26.2%) had a good knowledge of nursing care of chest drains. Knowledge was relatively higher among nurses who cared for chest drains daily, nurses who have a work experience of 10 years, ($P > 0.05$). The study concluded that knowledge of care of chest drains among nurses is poor. There is an urgent need to train them so as to improve the nursing care of patients managed with chest drains.

A descriptive study conducted by SuadJassim, Sabah Abbas Ahmed, Ali Hussein. Alek Al-Ganmi[35] in 2015 to evaluate the nursing management for patients undergoing to water seal chest tube drainage system. A non-probability purposive sampling technique was used to select a sample size of 50 nurses Data were collected by an application of direct observation as a means of data collection. Nurses were evaluated while they are working in the thoracic or surgical wards during the day.

The results of the study showed that the most of nurses that work in thoracic or surgical wards have deficit knowledge in some aspects related to nursing management provided to patients with under water- seal chest tube drainage system.

A descriptive study conducted by MerveTarhan, SongulAkbas, Gokduman, Abdul KadirAyan, Levent Dalar[36] in 2014 in chest disease and thoracic surgery hospital Maharastra. The aim of the study was to determine the nurses level of knowledge regarding care of patients with chest drains. The study was conducted with 153 nurses. Data was collected by means of structured questionnaire. The findings revealed that 55.6% were having sufficient knowledge and 44.6% were having insufficient knowledge.

A study conducted by Magner C, Houghton C, Craig M, Cowman S[37] in 2013 to assess Nurses' knowledge on chest drain management in an Irish Children's Hospital. A standardised descriptive survey approach was employed. The sample consisted of 121 critical care and ward nurses from a large urban pediatric hospital, who cared for chest drains on a regular basis. 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. The study concluded that nurses are engaging with methods of knowledge acquisition; however, those who have less contact with chest drains require regular updates.

A study conducted by Maggie P, Lit K, Han L, Wing H, Wai M, Johnny C.[38]in 2010 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.

A study conducted by Sullivan B[39] in 2008 on nursing management of patients with a chest tube drain. The results of the study showed that little had been written on the nursing management of chest tube drains and the literature highlighted a lack of national standardized guidelines for the nurses due to the wide range of thoracic conditions encountered by the clinical nursing staff. The researcher viewed that even though the themes such as pain management and mechanism of breathing come into the nursing domain, there is a lack of up-to-date literature for the nurse.

An exploratory descriptive survey was conducted by Lehwaldt D, Timmins F[40] in 2007 on the nurses' knowledge of chest drain care and the need for nurses to have in service education to provide the best care for clients 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.

4. Studies related to effectiveness of self-instructional module on knowledge regarding care of chest tube drainage.

A quazi experimental study conducted by Nabila A. Bedier; Amal Bakr Abo EL[41] in 2016 At Ismailia University Hospital, aimed to evaluate the impact of an educational program on nurses' knowledge related to care of patients with chest tube. The study was carried out on a convenient sample of 30 nurses working in intensive cardiothoracic unit, cardiothoracic care unit, and general surgical unit. Results of this study indicated that 96.7% of studied nurses had statistically significant unsatisfactory level of knowledge preprogram implementation. The statistically significant level of improvement in nurses' knowledge P<0.0001 was very high immediately after the program implementation and there was decline in the studied nurses' total knowledge scores throughout the first follow –up and second fellow up after program implementation but it showed significant improvement than pretest (P=1.0, P<0.0001 respectively).

A study conducted by Virendra Singh Choudhary, Geeta Chaudhary[42] in 2016 to assess effectiveness of SIM on knowledge regarding care of patients with chest tube drainage. Pre-experimental single group pretestposttest design was used to assess the knowledge of 30 Staff nurses with non-probability convenient sampling technique. Structured knowledge assessment questionnaire was used to assess the knowledge of Staff nurses and self-instructional module was administered to improve knowledge of staff nurses regarding nursing management of patients with chest drainage. Findings of the study indicated that there was increase in mean post-test knowledge scores (23.0) as compared to mean pretest knowledge scores (13.20) at p<0.05 level of significance which established effectiveness of Self-instructional module.

A quazi experimental study conducted by Patel Krishna, Ravindra HN[43] in 2014to assess effectiveness of planned teaching programme on knowledge regarding Inter-costal drainage care among 60 staff nurses in Dhirajhospital, Pipariya, Vadodara. Study revealed that the post-test mean knowledge score was greater than mean pre-test knowledge score at 0.01 level of significance. Study concluded that the planned teaching programme was highly effective in improving knowledge of staff nurses regarding intercostal drainage.

A study Conducted by VaishaliSukhdeoraoSoge, Anuy Ramesh, Vidya Sahare[44]in 2014 a study to assess effectiveness of planned teaching programme regarding care of patients with chest tube drainage among nurses. The data was collected from 50 nurses by structured knowledge questionnaire.

Results revealed that 60% of nurses were having good knowledge and 40% were having satisfactory level of knowledge score in pre-test, and it was found that in post-test 14% were having good knowledge and 86% had excellent level of knowledge, The study concluded that planned teaching programme was effective in improving the knowledge level of nurses.

A pre-experimental study conducted by Preeti R. Bhupali, Ramachandra S. Hooli, Sheela Williams[45] in 2013at a tertiary care hospital & Medical Research Centre, Belgaum, Karnataka 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. 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. 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.

A study conducted by Pradhan Rashmi Mala[46]in 2013to assess effectiveness of self-instructional module on nursing management of patients with chest tube drainage among 30 staff nurses of selected hospital in Odhisa. Study findings revealed that majority of respondents (83.33%) had only average knowledge whose percentage of score ranged between 35–70%. The overall pre-test mean score was 18.73 4.05(53.51%) whereas in post-test it was 27.16 4(77.6%) revealing 24.09% enhancement of knowledge score

Extremely statistical significant difference was found between the total knowledge score of pre and post-test (P=0.0001) revealing effectiveness of self-instructional module. No significant association was found between pre-test knowledge score of nurses when compared to demographic variables.

5. Studies related to skill regarding care of chest tube drainage.

A descriptive study conducted by Magda Abdelaziz Mohammed, Mahmoud Elprince Mahmoud, Hamdy A Sleem, Noha Mohammed Ibrahim[47] in 2011 to assess nurses' performance in providing care to patients undergoing chest tube. A total number of 70 nurses were selected randomly using systematic sampling technique. Only knowledge about documentation was satisfactory among more than half of the studied nurses (51.4%) as compared to all other studied parameters about chest tube. The lowest levels of knowledge were recorded for nursing care for patient with chest tube (22.9%), problems associated with chest tube (25.7%), and indications of chest tube (28.6%).

Findings also revealed, that the majority of nurses graduated from nursing institute (85.7%) had a satisfactory knowledge level compared to 16.1% of nurses with nursing diploma. Moreover, half of nurses graduated from nursing institute (50%) had satisfactory level of the total knowledge compared to 17.9% of nurses with diploma. The observed relation were statistically significant where (P<0.0001, P=0.012 respectively). Findings also revealed that the nurses who practiced care of patient after thoracotomy and were graduated from nursing institute (100%) had a satisfactory level of practice compared to only 42.9% of nurses who had a nursing diploma. The observed relation was statistically significant where (P=0.009).

A quasi experimental study conducted by Reda Abdel Salam Ibrahim and Monera Elshemy[48] in 2016to assess knowledge, practice of nurses regarding care of chest tube and to evaluate the impact of educational program on knowledge and practices of nurses about caring of patient with chest tube. The total number was 40 nurses. The mean posttest knowledge scores of studied nurses regarding chest tube had significantly higher than their mean pretest knowledge scores as test P< 0.05 level of significance. Total performance level was unsatisfactory less than 60% in preprogram implementation, while immediate post program 40% of studied nurses had satisfactory performance and after month of program implantation 42.5% of nurses performance needed improvement.

Objectives of the Study

1.   To assess the pre-interventional knowledge score regarding care of chest tube drainage among staff nurses (Pre-test)

2.   To assess the post-interventional knowledge score regarding care of chest tube drainage among staff nurses (Post-test).

3.   To evaluate the effectiveness of self-instructional module by comparing pre-interventional & post-interventional knowledge scores regarding care of chest tube drainage among staff nurses.

4.   To associate the pre-test knowledge scores regarding care of chest tube drainage among staff nurses with their demographic variables. (Gender, Professional Qualification, & Years of Working Experience).

5.   To assess the pre-interventional skill score regarding care of chest tube drainage among staff nurses (Pre-test).

6.   To assess the post-interventional skill score regarding care of chest tube drainage among staff nurses (Post-test).

7.   To evaluate the effectiveness of demonstration by comparing pre-interventional & post-interventional skill scores regarding care of chest tube drainage among staff nurses.

8.   To associate the pre-test skill scores regarding care of chest tube drainage among staff nurses with their demographic variables.(Gender, Professional Qualification, &Years of Working Experience).

Hypotheses

H_1:   There is significant increase in the mean post- test knowledge score as compared to mean pre-test knowledge score regarding care of chest tube drainage among staff nurses at 0.05 level of significance.

H_2:   There is significant increase in the mean post- test skill score as compared to mean pre-test skill score regarding care of chest tube drainage among staff nurses at 0.05 level of significance

H_3:   There is significant association between the pre-test knowledge score regarding care of chest tube drainage among staff nurses with their demographicvariables. (Gender, Professional Qualification, Years of Working Experience) at 0.05 level of significance.

H_4:   There is significant association between the pre-test skill score regarding care of chest tube drainage among staff nurses with their demographic variables. (Gender, Professional Qualification, Years of Working Experience) at 0.05 level of significance

III. Research Methodology

Research methodology is a way to systematically solve the research problem. Research methods are the techniques used by the researcher to structure a study, gather and analyze the information relevant to the research questions. It helps the researcher to project a blueprint of the research undertaken. The methodology of research indicates the general pattern of gathering valid & reliable data & organizing the data for the purpose of investigation.[16]

This chapter unfolds the description of research methodology adopted by the investigator to study and analyze the effectiveness of self-instructional module on knowledge and skill regarding care of chest tube drainage among staff nurses.The various steps undertaken to conduct the study are: research approach, research design, setting, population, sample and sampling technique, criteria for selection of sample, development and description of tool, tool tryout, pilot study, data collection and plan for data analysis.

▪ **Research Approach**

Research approach is a systematic, controlled, empirical and critical investigation of natural phenomena guided by theory and hypothesis about the presumed relations among such phenomena.[49]

In view of the nature of the problem under study and to accomplish the objectives of the study, quantitative research approach was found to be appropriate to assess the effectiveness of self-instructional module on knowledge and skill regarding care of chest tube drainage among staff nurses .This type of approach is based on the measurement of quantity. In this type of research, data is collected in numerical form and analysed by using descriptive or inferential statistics.[50]

▪ **Research Design**

The research design is the researchers overall plan for answering the research question. A research design is a blue print for conducting the study that maximizes control over factors that could interfere with the validity of findings.[51,52].

The research design selected for this study was Pre Experimental One Group Pre Test Post Test Design. In the present study Structured Knowledge Questionnaire and Checklist was administered to Staff nurses as a Pre-test measure and the Intervention was given in the form of self-instructional module and Post Test was taken after giving Intervention.

Table 1: Representation of Research Design

Group	Pre-test Day 1	Intervention Day 1	Post test Day 5
Staff nurses	O_1	X	O_2

O_1 **(pre-test)**: Assessment of knowledge and skill regarding Care of chest tube drainage.

X (Intervention): Administration of self-instructional module on knowledge and demonstration on skill regarding care of chest tube drainage.

O_2 **(Post-test):** Re-assessment of knowledge and skill regarding care of chest tube drainage among staff nurses after administration of self-instructional module and demonstration through same structured knowledge questionnaire and observation checklist.

• **Variables**

A variable is an attribute of a person or object that varies and takes on different values.[47]The following types of variables were identified in the study:

• **Independent Variable:** An independent variable is a factor that can be varied or manipulated in an experiment to create an effect on the dependent variable. Therefore, the independent variable is the presumed cause.[53]

In the present study the independent variable was the "self-instructional module and demonstration on skill regarding care of chest tube drainage".

• **Dependent Variable:** A dependent variable is what you measure in the experiment and what is affected during the experiment. The dependent variable responds to the independent variable.[54] Therefore the dependent variable is the presumed effect. In the present study, the dependent variable was "Knowledge and skill of staff nurses regarding care of chest tube drainage".

• **Demographic variables:** It includes Gender, Professional Qualification, and Years of Working Experience.

• **Research Setting**

Settings are the most specific places where data collection occurs based on the nature of research question & the type of information needed to address it.[16]

The setting chosen for present study were Selected Surgical Wards (Surgical causality ward, Surgical observation ward, Post-operative ward, SICCU, CICCU,CVTS ward) of SKIMS hospital Soura Srinagar.

Study Population

A population is the entire aggregation of cases in which a researcher is interested.[55]

In the present study, the population consisted of staff nurses who were working at SKIMS hospital Soura Srinagar.

Sample and Sampling technique

A sample is a portion of the population that represents the entire population. Thus, it is a subset of the population. Sampling technique defines the process of selecting representative elements of the population with which to conduct a study.[56]

The sample for the present study comprised of 50 staff nurses working at SKIMS hospital Soura Srinagar Kashmir.

The "purposive sampling technique" was adopted to select the sample for the present study. In this type of sampling, researcher selects the sample elements on the basis of presence of the characteristics of the sample to be selected[56].

- **Sampling Criteria**

The researcher specifies the characteristics of the population by keeping Inclusion & Exclusion criteria in the study. Inclusion criteria are the characteristics that each sample element must possess to be included in the study. Exclusion criteria are the characteristics that a participant may possess that could confound the results of study. The criteria used to define population for research project have implications for the interpretation of the results and generalizability of findings.

a) **Inclusion Criteria**

Staff nurses:
- Working in selected surgical wards of SKIMS HOSPITAL SOURA Srinagar
- Present at the time of data collection.
- Willing to participate

b) **Exclusion Criteria**
- Staff nurses:
- Who were not available at the time of data collection
- Who were not willing to participate

- **Data collection tool and technique**

An instrument is a device or technique that a researcher uses to collect data. The most important and crucial aspect of any investigation is the collection of appropriate information, which provides necessary data for the study.[17] In the present study data collection tools used were "Structured knowledge questionnaire and observation checklist" to assess the knowledge and skill of staff nurses regarding care of chest tube drainage.

Analysis and Interpretation:

Analysis is the process of organizing and synthesizing the data so as to answer the research question and test hypothesis. Interpretation of data is an activity of critical thinking, which is done carefully through brain storming to infer the condensed and statistically computed data so that the research question is answered and hypothesis are tested.[57]

This chapter deals with analysis and interpretation of data collected from 50 study subjects on knowledge and skill regarding care of chest tube drainage among staff nurses. The data collected were fed to a computer and analyzed using the statistical Package for the Social Sciences (SPSS), version 20.0. Qualitative data was described using number and percent. Quantitative data was described using mean, standard deviation and range. Paired t-test was used to analyze two paired data. Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level. The findings were organized and presented in tables and figures. The details of each section are presented below to correlate with the objectives. The data analysis was done on the basis of following objectives:

1. To assess the pre-interventional knowledge score regarding care of chest tube drainage among staff nurses. (Pre-test)
2. To assess the post-interventional knowledge score regarding care of chest tube drainage among staff nurses (Post-test).
3. To evaluate the effectiveness of self-instructional module by comparing pre-interventional & post-interventional knowledge scores regarding care of chest tube drainage among staff nurses.
4. To associate the pre-test knowledge scores regarding care of chest tube drainage among staff nurses with their demographic variables. (Gender, Professional qualification &Years of working experience).

5.   To assess the pre-interventional skill score regarding care of chest tube drainage among staff nurses (Pre-test).
6.   To assess the post-interventional skill score regarding care of chest tube drainage among staff nurses (Post-test).
7.   To evaluate the effectiveness of demonstration by comparing pre-interventional & post-interventional knowledge scores regarding care of chest tube drainage among staff nurses.
8.   To associate the pre-test skill scores regarding care of chest tube drainage among staff nurses with their selected demographic variables. (Gender, Professional qualification, &Years of working experience).

On the basis of the research statement following hypothesis were formulated:
H_1:   There is significant increase in the mean post-test knowledge score as compared to mean pre-test knowledge score regarding care of chest tube drainage among staff nurses at 0.05 level of significance.
H_2:   There is significant increase in the mean post-test skill score as compared to mean pre-test skill score regarding care of chest tube drainage among staff nurses at 0.05 level of significance
H_3:   There is significant association between the pre-test knowledge score regarding care of chest tube drainage among staff nurses with their demographic variables. (Gender, Professional Qualification, Years of Working Experience) at 0.05 level of significance.
H_4:   There is significant association between the pre-test skill score regarding care of chest tube drainage among staff nurses with their demographic variables. (Gender, Professional Qualification, Years of Working Experience) at 0.05 level of significance.

Organization of study findings:
The substantive summary of this chapter is under the following sections.
Section 1:   Distribution of demographic variables of the study subjects were analysed by frequency and percentage and was presented in tables and figures.
Section 2:   Knowledge scores regarding care of chest tube drainage, which was sub-   divided as follows:
2.1   Pre-test knowledge scores of study subjects regarding care of chest tube drainage.
2.2   Post-test knowledge scores of study subjects regarding care of chest tube drainage.
Section 3:   Comparison of pre-test with post-test knowledge scores regarding care of chest tube drainage.
Section 4:   Association of pre-test knowledge scores of study subjects with their selected demographic variable (Gender, Professional qualification, & Years of working experience).
Section 5:   Skill scores regarding care of chest tube drainage, which was sub-divided as follows:
5.1   Pre-test skill scores of study subjects regarding care of chest tube drainage.
5.2   Post-test skill scores of study subjects regarding care of chest tube drainage.
Section 6:   Comparison of pre-test with post-test skill scores regarding care of chest tube drainage.
Section 7:   Association of pre-test skill scores of study subjects with their selected demographic variable (Gender, Professional qualification, & Years of working experience).

Section 1: Distribution of study subjects according to demographic variables.
Table 4: Distribution of study subjects according to gender.
N =50

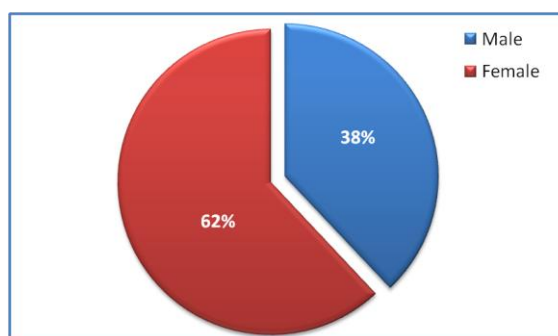| Gender	Study Subjects	
	Frequency	Percentage (%)
Male	19	38
Female	**31**	**62**

Fig 3: Percentage distribution of study subjects according to gender.

The data presented in table 4and fig. 3 shows that most of study subjects i.e, 31 (62%) were females and 19 (38%) were males.

Table 5: Distribution of study subjects according to Professional qualification.
N=50

Professional Qualification	Study Subjects	
	Frequency	Percentage (%)
G.N.M	19	38
B.SC NURSING	26	52
M.SC NURSING	5	10
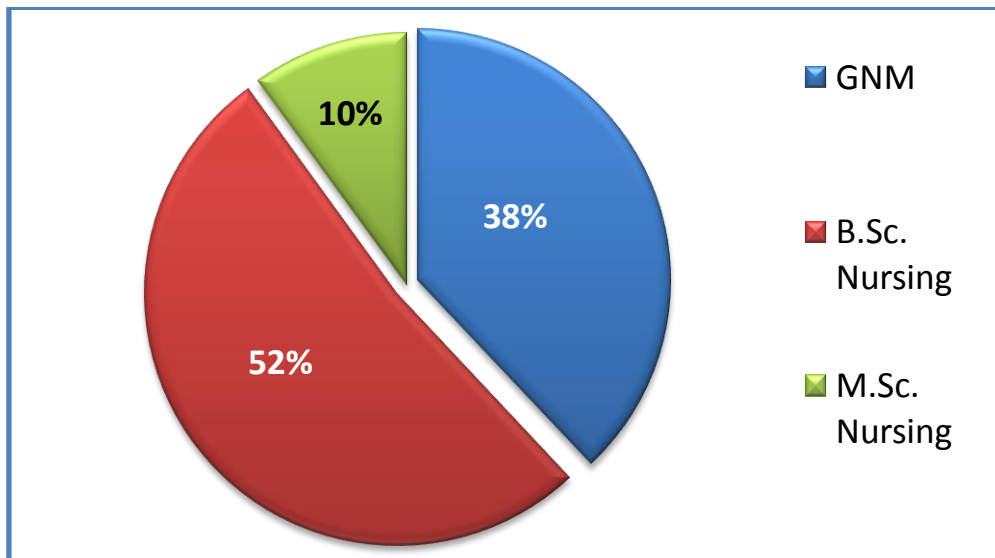
Fig 4: Percentage distribution of study subjects according to professional qualification.

The data presented in table 5& fig.4 shows that most i.e 26(52%) of the staff nurses were having qualification of B.Sc., 19(38%) were having G.N.M, & few, 5 (10%) were having M.Sc. nursing.

Table 6: Distribution of study subjects according to years of experience.
N=50

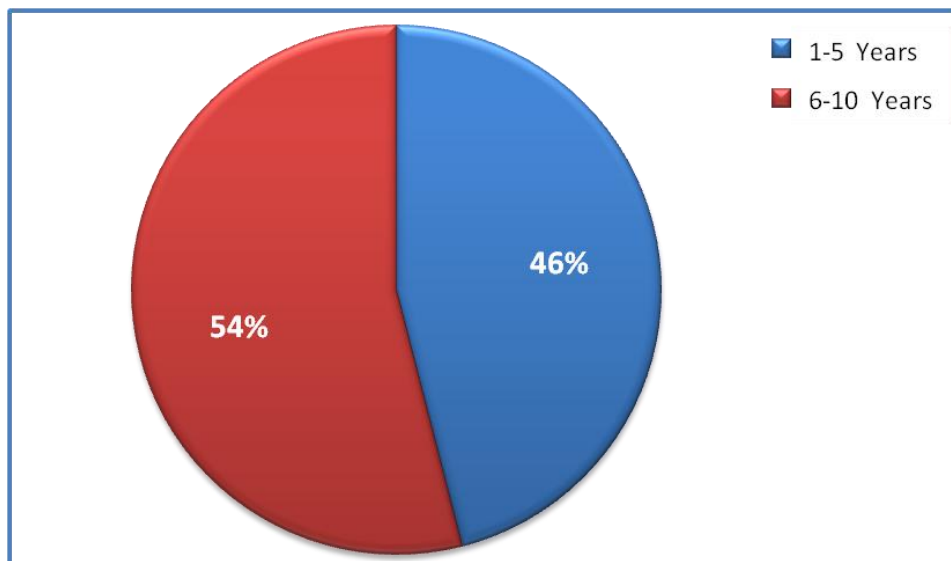| Years of experience	Study Subjects	
	Frequency	Percentage (%)
1-5 years.	23	46
6-10 years.	27	54

Fig 5: Percentage distribution of study subjects according to years of experience.

The data presented in table 6 and fig.5.represents that maximum number of the study subjects i.e, 27(54%) were having working experience of 6-10 years, while as 23(46%) were having working experience of 1-5 years.

Section 2: Pre-test and post-test knowledge score of study subjects regarding care of chest tube drainage.
Table 7: Distribution of study subjects according to pre-test level of knowledge regarding care of chest tube drainage.

N=50

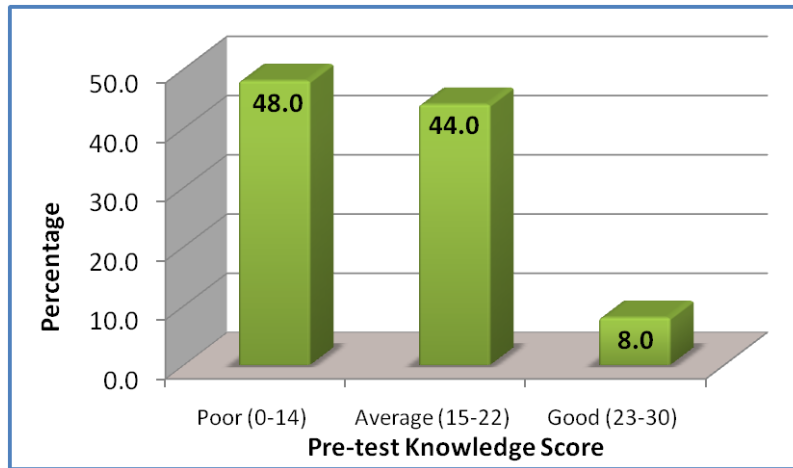| Pre-test Knowledge level score	No. of Subjects	
	Frequency	Percentage (%)
Poor(0-14)	24	48
Average(15-22)	22	44
Good(23-30)	4	8

Fig 6: **Percentage distribution of study subjects according to pre-test level of knowledge regarding care of chest tube drainage.**

The data presented in table 7, fig. 6 depicts that in the pre-test most of the study subjects i.e, 24(48%) had poor knowledge, 22 (44%) had average knowledge whereas only 4(8%) had good knowledge.

Table 8: Pre-test Mean knowledge score, SD, Median score, Maximum score, Minimum score, Range, Mean percentage knowledge of study subjects regarding care of chest tube drainage.

N=50

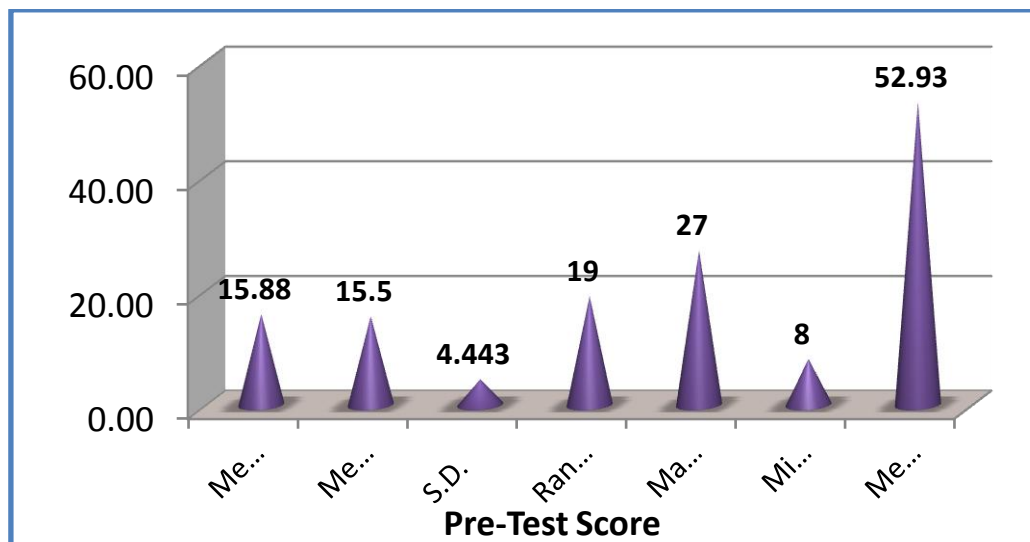| Pre-Test Knowledge Score	Mean ± SD	Median	Maximum	Minimum	Range	Mean Percentage
	15.88 ±4.443	15.5	27	8	19	52.93

Fig: 7. **Pre-test Mean knowledge score, SD, Median score, Maximum score, Minimum score, Range, Mean percentage knowledge of study subjects**

Table 8& Fig.7, shows that the pre-test (Mean ± SD) knowledge score of study subjects regarding care of chest tube drainage was (15.88± 4.443), Median was 15.5, Maximum score was 27, Minimum score was 8, Range was 19 and Mean percentage knowledge score was 52.93.

Table 9: Distribution of study subjects according to post-test knowledge level regarding care of chest tube drainage.

N=50

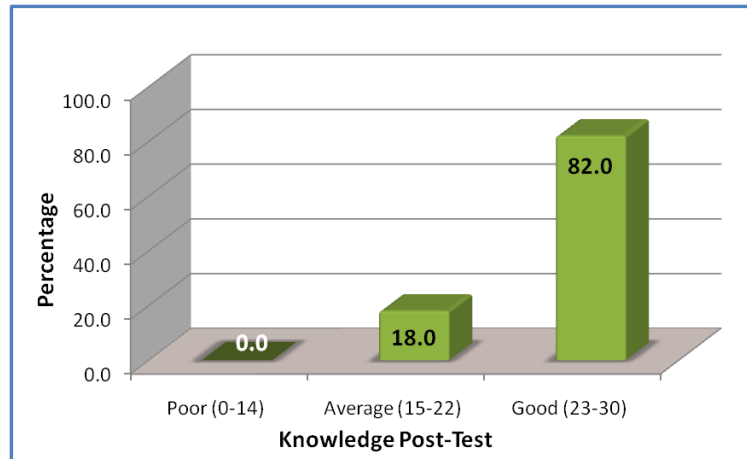| Post-test knowledge level score	No. of Subjects	
	Frequency	Percentage (%)
Poor (0-14)	0	0
Average (15-22)	9	18%
Good (23-30)	41	82%

Fig. 8:   Post-test knowledge percentage of study subjects regarding care of chest tube drainage.

Table 9, fig. 8 shows that in the post test, maximum number of the study subjects i.e., 41 (82%) had good knowledge, 9(8%) had average knowledge, & none of the subjects had poor knowledge in the post-test.

Table 10: Post-test Mean knowledge score, SD, Median score, Maximum score, Minimum score, Range and Mean percentage knowledge of subjects regarding care of chest tube drainage.

N=50

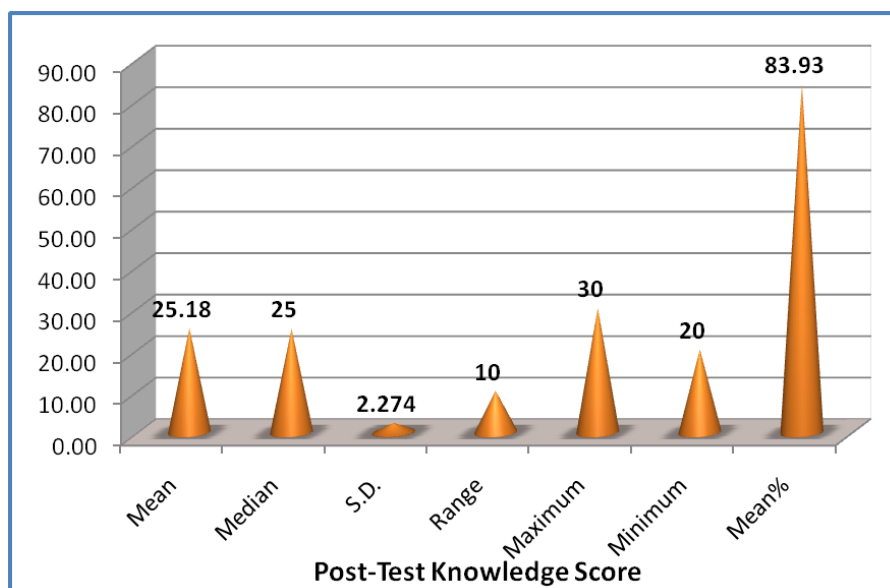| Post-Test Knowledge Score	Mean ± SD	Median	Maximum	Minimum	Range	Mean%
	25.18 ±2.274	25	30	20	10	83.93

Fig: 9.   Post-test Mean knowledge score, SD, Median score, Maximum score, Minimum score, Range and Mean percentage knowledge of subjects

Table 10& fig.9, shows that the post-test (Mean± SD) knowledge score was (25.18± 2.274), Median score was 25, Maximum score was 30, Minimum score was 20, Range was 10 and Mean percentage knowledge was 83.93.

Section 3: Comparison of pre-test and post-test knowledge score of study subjects regarding care of chest tube drainage.
To test the significance, following Null hypothesis was formulated.
H_{01}:   There is no significant increase in post-test knowledge scores regarding care of chest tube drainage among staff nurses at 0.05 level of significance.

Table 11: Frequency and Percentage distribution of study subjects according to pre-test and post-test knowledge score regarding care of chest tube drainage.

N=50

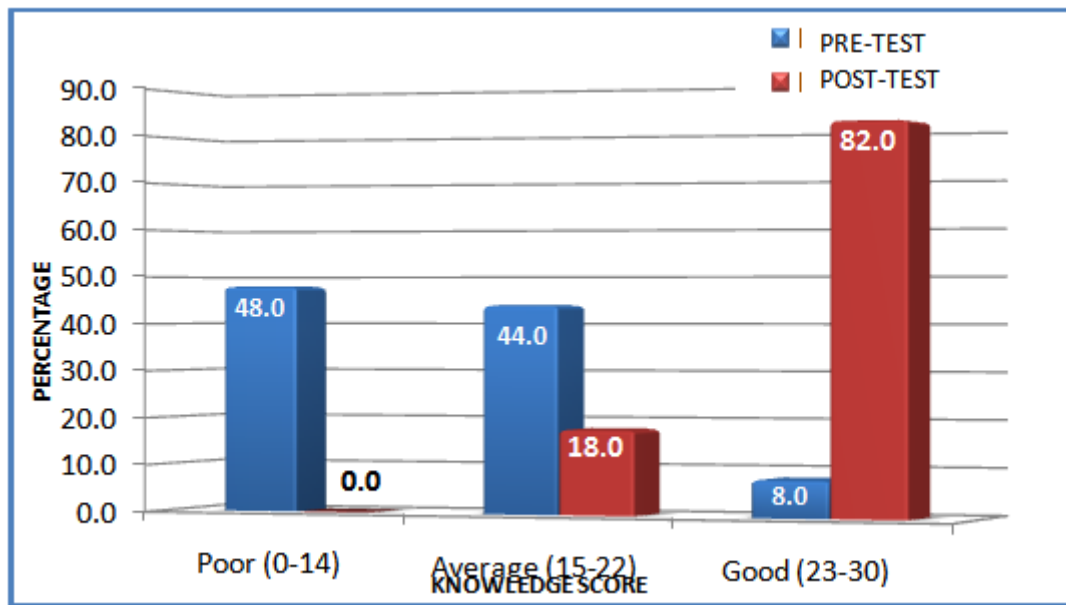| Pre-test & Post-test Knowledge level score	No. of subjects in Pre-Test		No. of subjects in Post-Test	
	Frequency	Percentage	Frequency	Percentage
Poor (0-14)	24	48%	0	0%
Average (14-22)	22	44%	9	18%
Good (23-30)	4	8%	41	82%

Fig 10: Percentage distribution of the pre-test and post-test knowledge scores.

The data presented in table 11 and fig. 10 shows that in the pre-test 24(48%) of subjects had poor knowledge while as in the post-test none of the subjects had poor knowledge. Consequently, 22(44%) of subjects in the pre-test had 'average knowledge' and in the post-test only 9(18%) of subjects had average knowledge, In the pre-test only 4(8%) subjects had good knowledge while as most of the subjects i.e., 41(82%) had good knowledge in the post-test.

Table 12: Mean, Standard deviation, paired "t" test between pre-test and post-test Knowledge scores of study subjects.

N=50

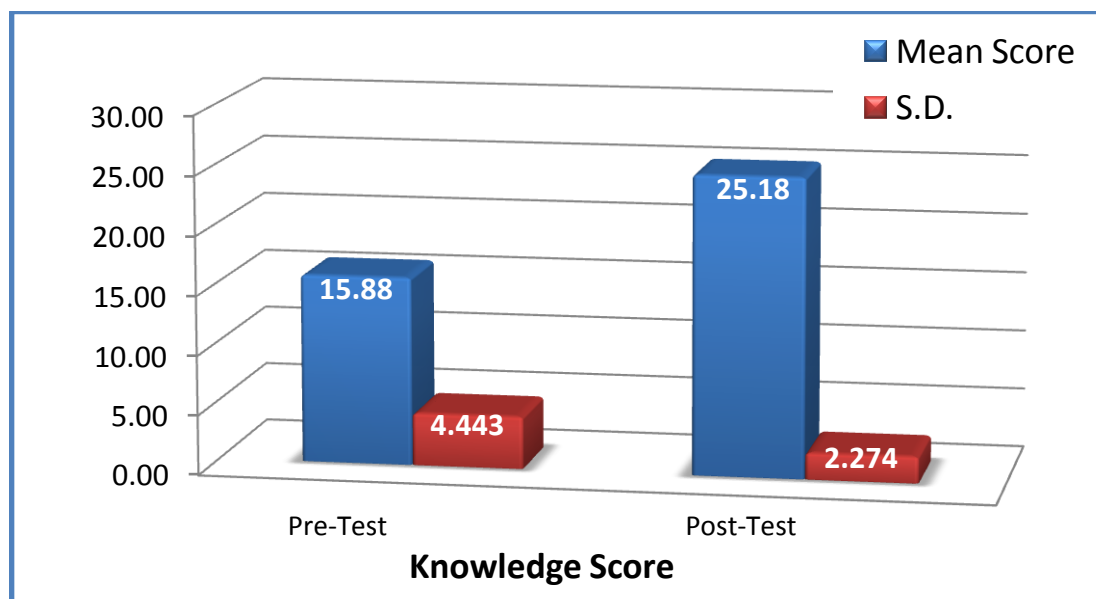| Pre-test & Post-test Knowledge score	Mean ± SD	Mean Difference	t value	p value
Pre-test score	15.88± 4.443	9.300	25.321	<0.001*
Post test score	25.18±2.274			

*=Signficicant

Fig 11: Pre-test and post-test mean knowledge scores and SD.

It is evident from the data presented in table 12, fig 11that (Mean ±SD) post-test knowledge score (25.18.12±2.274), was higher than (Mean ±SD) pre-test knowledge (15.88±4.443), of study subjects with mean difference of knowledge (9.300) regarding care of chest tube drainage which was found to be significant($p<0.001$).

The post-test knowledge scores were significantly higher than their pre-test scores. This indicates that the self-instructional module was significantly ($p< 0.05$; <0.001) effective in improving the knowledge regarding care of chest tube drainage among study subjects.

The above findings support the research hypothesis (H_1) which states that there is a significant increase in the post test knowledge scores regarding care of chest tube drainage among staff nurses at 0.05 level of significance. Hence null hypothesis (H_{01}) was rejected

Table 13: Item-wise distribution of correct responses of the subjects in the pre-test and the post-test knowledge.

N=50

Areas	Knowledge Questions	Pre-test Correct (%)	Post-test Correct (%)
Part-A (concept of chest tube drainage)	Qno.1	52	100
	Qno.2	64	98
	Qno.3	98	100
	Qno.4	34	80
	Qno.5	22	78
	Qno.6	84	96
	Qno.7	46	86
	Qno.8	90	94
	Qno.9	24	70
	Qno.10	86	92
	Qno.11	96	96
	Qno.12	56	76
	Qno.13	52	82
Part-B	Qno.14	94	96

(Assessment of chest tube drainage)	Qno.15	34	64
	Qno.16	16	70
	Qno.17	84	94
Part-C (Assessment of functioning of chest tube drainage)	Qno.18	94	92
	Qno.19	12	70
	Qno.20	14	52
	Qno.21	82	88
Part-D (Measures to promote flow of chest tube drainage)	Qno.22	38	82
	Qno.23	58	78
	Qno.24	78	86
Part-E (Clamping of chest tube drainage)	Qno.25	4	72
	Qno.26	0	82
	Qno.27	10	88
Part-F (Physical Activity of patient with chest tube drainage)	Qno.28	82	94
	Qno.29	58	84
	Qno.30	26	78

It is evident from table 13 that for each item, the frequency percentage of correct responses of the study subjects in the post-test was higher than the frequency percentage of correct responses in the pre-test. This indicates that the self-instructional module on knowledge regarding care of chest tube drainage was effective in improving the knowledge scores of the study subjects regarding care of chest tube drainage.

Section 4: Analysis and interpretation of data to find out an association between pre–test knowledge scores of study Subjects regarding care of chest tube drainage with their selected demographic variables (Gender, professional qualification, and years of experience.)
To find out the association, following Null hypothesis was formulated:
H_{03}**:** There is no significant association of pre-test knowledge scores of staff nurses regarding care of chest tube drainage with their selected demographic variables (Gender, professional qualification, and years of experience).

Table 14: Association of pre-test knowledge scores of study subjects with their selected demographic variables (Gender, professional qualification, years of working experience).
N=50

Demographic Variables		Frequency			Chi-Square Test	P value
		Good	Average	Poor		
Gender	Male	1	8	10	0.449	0.7991NS
	Female	3	14	14		
Professional qualification	GNM	0	12	17	58.104	<0.001*
	B.SC	0	19	7		
	M.SC	4	1	0		
Years of working experience	1-5 Years	0	0	23	46.142	<0.001*
	6-10 Years	4	22	1		

*=Significant;　　　　　NS= Non- Significant

The data presented in the table 14 indicates that there was statistically significant association between pre-test knowledge scores of subjects with their professional qualification and years of experience (p<0.001) while as no association was found between pre-test knowledge scores of study subjects with their gender variable.

The above findings support the research hypothesis (H₃) which states that there is significant association of pre-test knowledge scores of staff nurses with their selected demographic variables (Gender, professional qualification, years of working experience) and hence the researcher rejected the null hypothesis (H03) for professional qualification and years of working experience while as accepted for gender variable at p<0.05 level of significance.

Section 5: Pre-test and post-test skill score of study subjects regarding care of chest tube drainage.

Table 15: Distribution of study subjects according to pre-test level of skill regarding care of chest tube drainage.

N=50

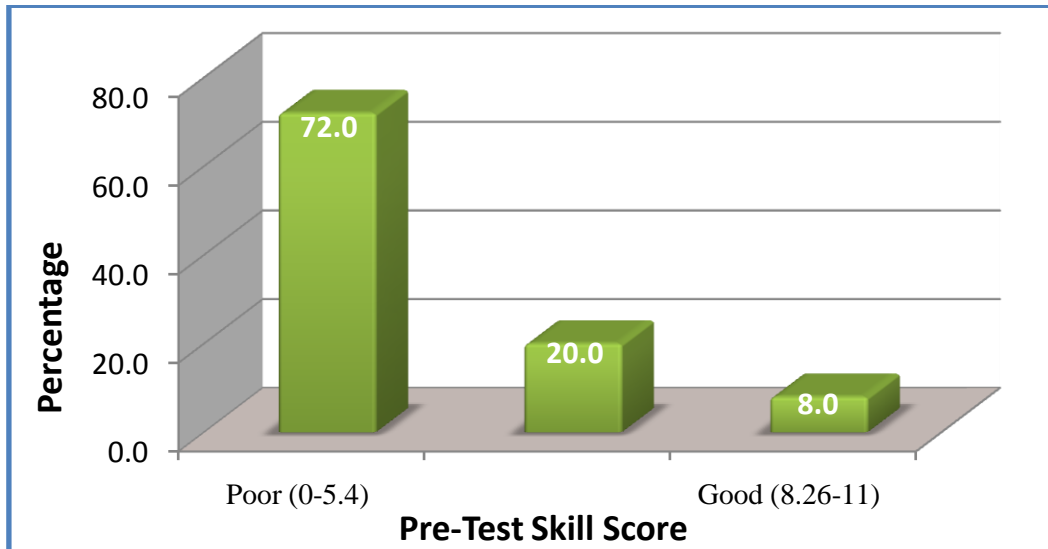| Pre-test skill level score	No. of Subjects	
	Frequency	Percentage (%)
Poor(0-5.4)	36	72
Average(5.5-8.25)	10	20
Good (8.26-11)	4	8

Fig.12: Percentage distribution of study subjects according to pre-test level of skill scores regarding care of chest tube drainage.

The data presented in table 15, fig. 12depicts that in the pre-test most of the study subjects i.e, 36(72%) had poor skill, 10 (20%) had average level of skill whereas only 4(8%) had good skill.

Table 16: Pre-test Mean skill score, SD, Median score, Maximum score, Minimum score, Range, Mean percentage skill of study subjects regarding care of chest tube drainage.

N=50

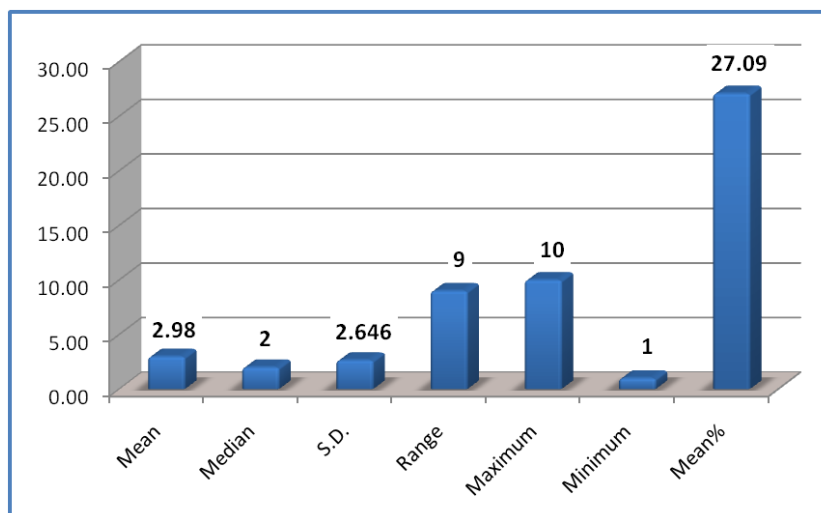| Pre-Test skill Score	Mean ± SD	Median	Maximum	Minimum	Range	Mean Percentage
	2.98±2.646	2	10	1	9	27.09

Fig: 13. Pre-test Mean skill score, SD, Median score, Maximum score, Minimum score, Range, Mean percentage skill of study subjects

Table 16& Fig.13, shows that the pre-test (Mean ± SD) skill score of study subjects regarding care of chest tube drainage was (2.98± 2.646), Median was 2, Maximum score was 10, Minimum score was 1, Range was 9 and Mean percentage knowledge score was 27.09.

Table 17: Distribution of study subjects according to post-test skill level regarding care of chest tube drainage.

N=50

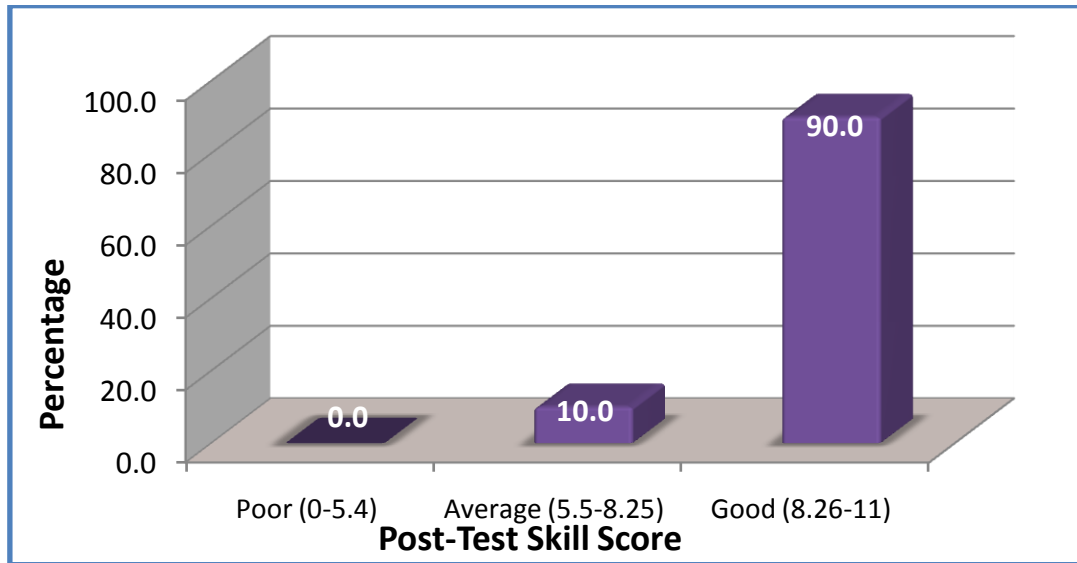| Post-test skill level score	No. of Subjects	
	Frequency	Percentage (%)
Poor (0-5.4)	0	0
Average (5.5-8.25)	5	10%
Good (8.26-11)	45	90%

Fig. 14: Post-test skill percentage of study subjects regarding care of chest tube drainage.

Table 17, fig. 14 shows that in the post test, maximum number of the study subjects i.e., 45 (90%) had good skill, 5(10%) had average skill, & none of the subjects had poor skill in the post-test.

Table18: Post-test Mean skill score, SD, Median score, Maximum score, Minimum score, Range and Mean percentage skill of subjects regarding care of chest tube drainage.

N=50

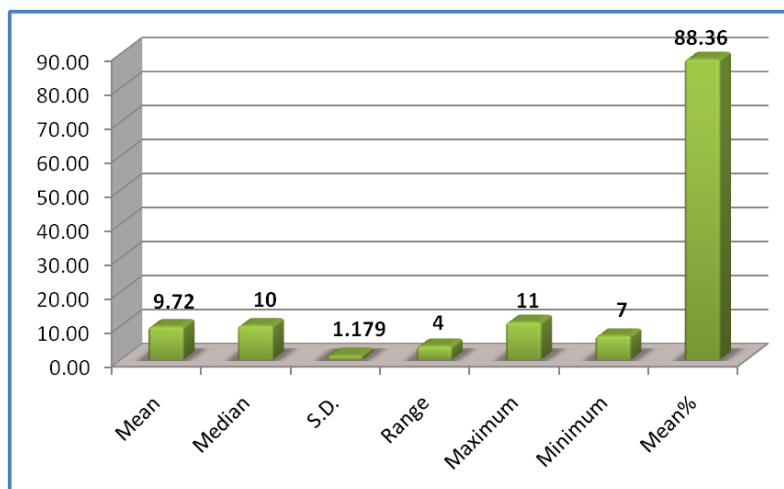| Post-Test skill Score	Mean ± SD	Median	Maximum	Minimum	Range	Mean%
	9.72±1.179	10	11	7	4	88.36

Fig: 15:Post-test Mean skill score, SD, Median score, Maximum score, Minimum score, Range and Mean percentage skill of subjects

Table 18 & fig.15, shows that the post-test (Mean± SD) skill score was (9.72.±21.179), Median score was 10 Maximum score was 11, Minimum score was 7, Range was 4 and Mean percentage skill was 88.36.

Section 6: Comparison of pre-test and post-test skill score of study subjects regarding care of chest tube drainage.
To test the significance, following Null hypothesis was formulated.
H_{02}: There is no significant increase in mean post-test skill scores as compared to mean post-test skill scores regarding care of chest tube drainage among staff nurses at 0.05 level of significance.

Table 19: Frequency and Percentage distribution of study subjects according to pre-test and post-test skill score regarding care of chest tube drainage.

N=50

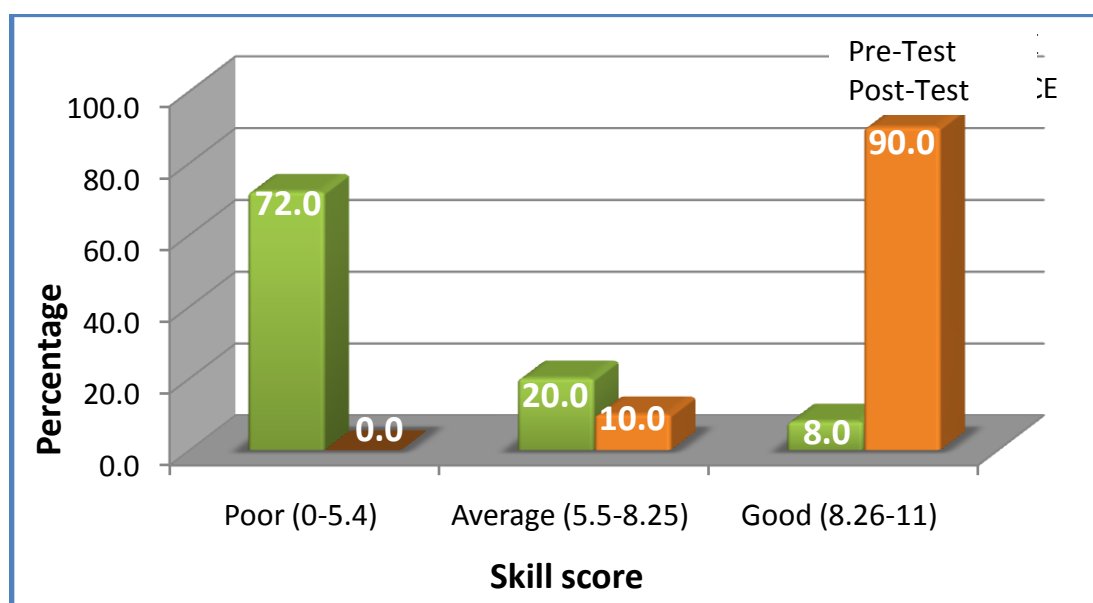| Pre-Test & Post-Test Skill Score	No. of Subjects in Pre-Test		No. of Subjects in Post-Test	
	Frequency	Percentage	Frequency	Percentage
Poor (0-5.4)	36	72%	0	0%
Average (5.5-8.25)	10	20%	5	10%
Good (8.26-11)	4	8%	45	90%

Fig 16: Percentage distribution of the pre-test and post-test skill scores.

The data presented in table 19 and fig. 16 shows that in the pre-test 36(72%) of subjects had below poor skill while as in the post-test none of the subjects had poor skill. Consequently, 10(20%) of subjects in the pre-test had 'average skill' and in the post-test only 5(10%) of subjects had average skill,in the pre-test only 4(8%) subjects had good skill while as most of the subjects i.e., 45(90%) had good skill in the post-test.

Table 20: Mean, Standard deviation, paired "t" test between pre-test and post-test skill scores of study subjects.

N=50

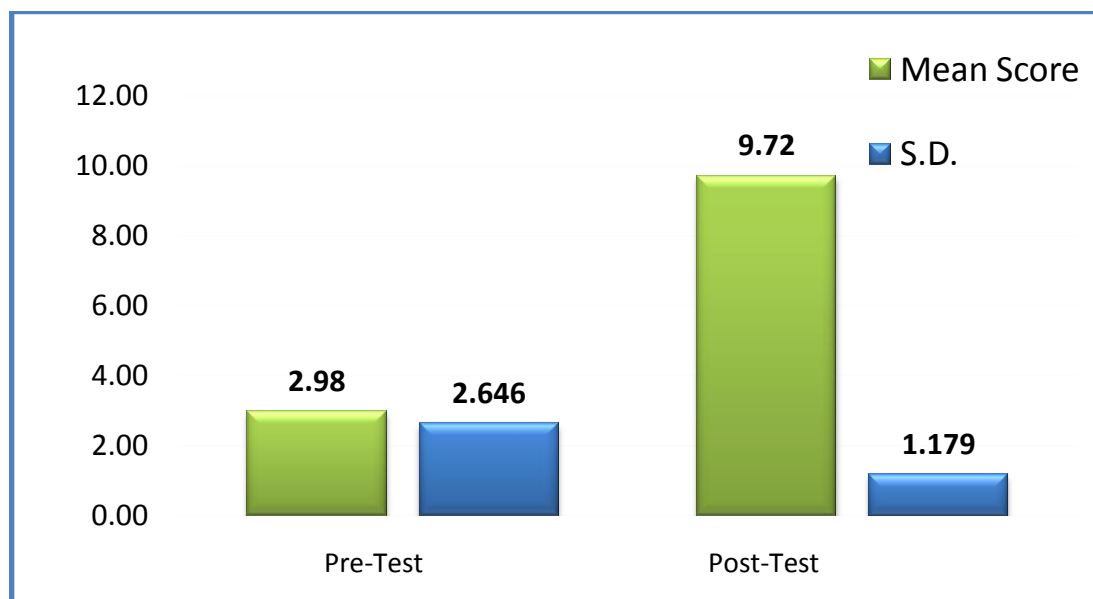| Pre-Test & Post-Test Skill Score	Mean ± SD	Mean-Difference	t value	p value
Pre-test score	2.98± 2.646	6.746	24.100	<0.001*
Post test score	9.72±1.179			

*=Significant

Fig 17: Pre-test and post-test mean skill scores and SD.

It is evident from the data presented in Table 20, Fig. 17 that (Mean ±SD) post-test skill score (9.72±1.179) was higher than (Mean ±SD) pre-test skill score (2.98±2.646) of study subjects with mean difference of (6.740) regarding care of chest tube drainage which was found to be significant($p<0.001$).

The post-test skill scores were significantly higher than their pre-test scores. This indicates that the demonstration on skill regarding care of chest tube drainage was significantly ($p< 0.05$) effective in improving the skill regarding care of chest tube drainage among study subjects.

The above findings support the research hypothesis (H_2) which states that there is a significant increase in the post test skill scores regarding care of chest tube drainage among staff nurses at 0.05 level of significance. Hence null hypothesis (H_{02}) was rejected.

Table 21: Item-wise distribution of correct responses of the subjects in the pre-test and the post-test.

N=50

	Area	Skill Questions	Pre-Test Correct (%)	Post-Test Correct(%)
Item wise Analysis	Checklist on a skill to assess functioning of chest tube drainage and measures to promote flow of chest drainage	**Q. No.1**	18	86
		Qno.2	18	100
		Qno.3	10	100
		Qno.4	22	100
		Qno.5	2	100
		Qno.6	6	72
		Qno.7	78	60
		Qno.8	74	88

		Qno.9	28	100
		Qno.10	14	100
		Qno.11	28	66

It is evident from table 21 that for each item, the frequency percentage of correct responses of the study subjects in the post-test was higher than the frequency percentage of correct responses in the pre-test. This indicates that the demonstration on skill regarding care of chest tube drainage was effective in improving the skill scores of the study subjects regarding care of chest tube drainage.

Section 7: Analysis and interpretation of data to find out an association between pre–test skill scores of study Subjects regarding care of chest tube drainage with their selected demographic variables (Gender, professional qualification, and years of working experience.)
To find out the association, following Null hypothesis was formulated:
H_{04}: There is no significant association of pre-test skill scores of staff nurses regarding care of chest tube drainage with their selected demographic variables (Gender, professional qualification, and years of working experience).

Table 22: Association of pre-test skill scores of study subjects with their selected demographic variables (Gender, professional qualification, and years of working experience).

N=50

Demographic Variables		Frequency			Chi-Square Test	P value
		Good	Average	Poor		
Gender	Male	1	3	15	0.764	0.682NS
	Female	3	7	21		
Professional qualification	GNM	0	2	17	41.886	0.000*
	B.SC	19	7	0		
	M.SC	0	1	4		
Years of experience	1-5 Years	0	0	23	16.564	0.000*
	5-10 Years	13	10	4		

*=Significant;   NS= Not-significant

The data presented in the table 22 indicates that there was statistically significant association between pre-test skill scores of subjects with their professional qualification and years of experience (p<0.001) while as no association was found between pre-test knowledge and skill scores of study subjects with their gender variable.

The above findings support the research hypothesis (H_4) which states that there is significant association of pre-test skill scores of staff nurses with their selected demographic variables (Gender, professional qualification, years of working experience) and hence the researcher rejected the null hypothesis (H03) for professional qualification and years of working experience while as accepted for gender variable at p<0.05 level of significance.

IV. Discussion:
This chapter deals with the discussion of the major findings of the study. The present study was undertaken to assess the effectiveness of self-instructional module on knowledge and demonstration on skill regarding care of chest tube drainage among staff nurses at SKIMS Hospital Soura Srinagar Kashmir. The present study was a pre-experimental study. One group pre-test post-test design was used to assess the

knowledge of 50 staff nurses on knowledge and skill regarding care of chest tube drainage in selected surgical wards of SKIMS Hospital Soura Srinagar, Kashmir. The study subjects were selected through purposive sampling technique. A Structured knowledge questionnaire and checklist was used to collect data from the study subjects. The effectiveness of self-instructional module was assessed by comparing the pre-test and post-test knowledge and skill scores.

Description of demographic variables of the study subjects

The demographic variables of the study subjects for the present study were: Gender, Professional qualification, years of working experience.

The findings related to frequency and percentage distribution of study subjects as per analysis of demographic variables revealed that:

Most of the subjects i.e,31 (62%) were females and 19 (38%) were males. These findings are comparable to the findings of a study conducted by Badria A. Elfaki, Hassanat E. Mustafa, Alaadin Hassan Ahmed[33] -2016to assess nurses knowledge and practice among (50) nurses employed in Sudan Heart Centre hospital. The study reflected majority of nurses 35/50 were females.

Regarding professional qualification maximum number of the study subjects i.e, 26(52%) were B.Sc nurses, 19(38%) were GNM, & 5 (10%) were M.Sc nurses.

Regarding years of working experience most of the study subjects i.e, 23(46%) were having 1-5 years of experience while as 27(54%) were having 6-10 years of experience.

Objective 1: To assess the pre-interventional knowledge score regarding care of chest tube drainage among staff nurses.

The pre-test (Mean ± SD) knowledge scores of the subjects was (15.88 ± 4.443) and Mean percentage knowledge score was 52.93.

In pre-test most of the study subjects i.e, 24 (48%) had poor knowledge, 22 (44%) had average knowledge whereas only 4(8%) had good knowledge.

These findings revealed that majority of the subjects had poor level of knowledge regarding the care of chest tube drainage. These findings are consistent with the findings of a study conducted by

Kesieme EB, Essu IS, Arekhandia BJ, Welcker K, Prisadov G[34]-2016toascertain the level of knowledge of care of chest drains among nurses working in wards in a teaching hospital in Nigeria. The study revealed that only 37 respondents (26.2%) had a good knowledge of nursing care of chest drains. Knowledge was relatively higher among nurses who cared for chest drains daily, nurses who have a work experience of 10 years, ($P > 0.05$). The study concluded that knowledge of care of chest drains among nurses is poor. There is an urgent need to train them so as to improve the nursing care of patients managed with chest drains.

These findings are also in agreement with the findings of a study conducted by Magda Abdel Aziz Mohammed, Mahmoud Elprince Mahmoud, Hamdy A Sleem,Noha Mohammed Ibrahim[47]-2011to assess nurse's performance in providing care to patients undergoing chest tube among 70 nurses. Only knowledge about documentation was satisfactory among more than half of the studied nurses (51.4%) as compared to all other studied parameters about chest tube. The lowest levels of knowledge were recorded for nursing care for patient with chest tube (22.9%), problems associated with chest tube (25.7%),and indications of chest tube (28.6%). (P<0.0001).

This implies that the staff nurses have lack of knowledge regarding the care of chest tube drainage due to which many complications can occur in patients with chest tube drainage. Hence there is a need for educating the staff nurses regarding the various management aspects of the patients with chest tube drainage so that the better care will be given to patients in order to reduce the risk of developing complications.

Objective 2: To assess the post-interventional knowledge scores regarding care of chest tube drainage among staff nurses.

The post-test knowledge scores reveal that maximum number of the study subjects i.e, 41(82%) had good knowledge, 9(8%) had average knowledge, & none of the subjects had poor knowledge in the post-test.

The post-test (Mean ± SD) knowledge score was (25.18 ± 2.274), and mean percentage knowledge was 83.93. These findings reveal that most of the subjects were having good knowledge in the post-test and there is a higher post-test knowledge score

The findings are consistent with the findings of a study by Preeti R. Bhupali, Ramachandra S. Hooli, Sheela Williams[45]-2013to 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 at a tertiary care hospital & Medical Research Centre, Belgaum, Karnataka on 55 nurses. The Study findings revealed that, out of 55 nurses 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.

The findings are also in agreement with the findings of study conducted by Pradhan Rashmi Mala[46]-2013to assess effectiveness of self-instructional module on nursing management of patients with chest tube drainage among 30 staff nurses of selected hospital in Odhisa. Study findings revealed that the overall pre-test mean score was 18.73 ± 4.05 (53.51%) whereas in post-test it was 27.16 ± 4 (77.6%) revealing 24.09% enhancement of knowledge score revealing effectiveness of SIM

The above evidence suggests that education of the staff nurses play an important regarding care of chest tube drainage because nurses are the important health care professionals who are in direct contact with the patient and when they have better knowledge, better care will be given by them.

Objective 3: To assess the effectiveness of self-instructional module on knowledge by comparing pre-interventional & post-interventional knowledge scores.

The post-test (Mean ± SD) knowledge score of the study subjects was (25.18.12 ± 2.274) which is significantly higher than the mean pre-test knowledge score of study subjects (15.88 ± 4.443) with mean difference of knowledge (9.300) regarding care of chest tube drainage The mean difference was statistically significant ($p<0.001$). This indicates that the 'Self-instructional module was effective in increasing the knowledge score of staff nurses regarding care of chest tube drainage.

These findings are consistent with the study conducted by Reda Abdel Salam Ibrahim and Monera Elshemy[48]- 2016to assess knowledge and practice of 40 nurses regarding care of chest tube and to evaluate the impact of educational program on knowledge and practices of nurses about caring of patient with chest tube. The mean post-test knowledge scores of studied nurses regarding chest tube had significantly higher than their mean pre-test knowledge scores at $P< 0.05$ level of significance. Total performance level of practice was unsatisfactory less than 60% in pre-program implementation, while immediate post program 40% of studied nurses had satisfactory performance.

The findings are also supported by the study conducted by Nabila A. Bedier, Amal Bakr Abo EL-Ata[41]-2016 to evaluate the impact of an educational program on knowledge of 30 nurses related to care of patients with chest tube at Ismailia University Hospital, which revealed that96.7% of studied nurses had statistically significant unsatisfactory level of knowledge pre-program implementation. The statistically significant level of improvement in nurses' knowledge $P<0.0001$ was very high immediately after the program implementation.

The findings also agree with the findings of the study conducted by Virendra Singh Choudhary, Geeta Chaudhary[42]-2016to assess effectiveness of SIM on knowledge regarding care of patients with chest tube drainage among 30 staff nurses. Findings of the study indicated that there was increase in mean post-test knowledge scores (23.0) as compared to mean pre-test knowledge scores (13.20) at $P< 0.05$ level of significance which established effectiveness of Self-instructional module.

Hence, it is evident that post-test knowledge scores of study subjects were higher than the pre-test knowledge scores. The lack of knowledge among the staff nurses can be due to lack of practice and lack of in service education. This suggests that there should be an in-service programme for nurses regarding the care of chest tube drainage so that they may remain updated with the recent advances in management of patients with chest tube drainages. These in-service programmes will also prepare better nurse educators.

Objective 4: To associate the pre-test knowledge scores with selected demographic variables (Gender, Professional qualification, Years of working experience)

Findings of the present study revealed that there was statistically significant association of the pre-test knowledge scores with the professional qualification and years of experience of the study subjects at (p=0.000) These findings are consistent with the findings of a study conducted by Badria A. Elfaki, Dr.Hassanat E. Mustafa, Prof.Alaadin Hassan Ahmed[33]- 2016to assess nurses knowledge and practice among (50) nurses employed in Sudan Heart Centre hospital Which showed that the nurses with master degree and experience more than 5 years had significant high knowledge than those with bachelor degree and experience from 1-5 years (P-value < 0.05).

Present study showed that there is no significant association of pretest knowledge score with gender

Objective 5: To assess the pre-interventional skill score regarding care of chest tube drainage among staff nurses.

The Pre-test (Mean ±SD) skill scores of the subjects was (2.98± 2.646) and Mean percentage skill score was 27.09.

In Pre-test most of the study subjects i.e, 24(48%) had poor knowledge, 36 (72%) had poor skill 10(20%) had average skill whereas only 4(8%) had good skill.

These findings revealed that majority of the subjects had poor level of skill regarding the care of chest tube drainage. These findings are consistent with the findings of a study conducted by Magda AbdelazizMohammed,MahmoudElprinceMahmoud,Hamdy A Sleem, Noha Mohammed Ibrahim[47]-2011to assess nurse's performance in providing care to patients undergoing chest tube among 70 nurses. Only knowledge about documentation was satisfactory among more than half of the studied nurses (51.4%) as compared to all other studied parameters about chest tube. The lowest levels of knowledge were recorded for nursing care for patient with chest tube (22.9%), problems associated with chest tube (25.7%), and indications of chest tube (28.6%). (P<0.0001).

This implies that the staff nurses have lack of skill regarding the care of chest tube drainage due to which many complications can occur in patients with chest tube drainage. Hence there is a need for educating the staff nurses regarding the various management aspects of the patients with chest tube drainage so that the better care will be given to patients in order to reduce the risk of developing complications.

Objective 5: To assess the post-interventional skill scores regarding care of chest tube drainage among staff nurses.

The post-test knowledge scores reveal that maximum number of the study subjects i.e, 45(90%) had good skill, 5(10%) had average skill, & none of the subjects had poor skill in the post-test.

The post-test (Mean ± SD) skill score was (9.72 ± 21.179), and mean percentage skill was 88.36. These findings reveal that most of the subjects were having good skill in the post-test and there is a higher post-test skill score

These findings are consistent with the study conducted by Reda Abdel Salam Ibrahim and Monera Elshemy[48] 2016to assess knowledge, practice of 40 nurses regarding care of chest tube and to evaluate the impact of educational program on knowledge and practices of nurses about caring of patient with chest tube. Total performance level of practice was unsatisfactory less than 60% in pre-program implementation, while immediate post program 40% of studied nurses had satisfactory performance.

The above evidence suggests that education of the staff nurses play an important role regarding care of chest tube drainage because nurses are the important health care professionals who are in direct contact with the patient and when they have better knowledge, better care will be given by them.

Objective 6: To assess the effectiveness of demonstration on skill by comparing pre-interventional & post-interventional skill scores.

The post-test (Mean ± SD) skill score of the study subjects was (25.18.12 ± 2.274) which is significantly higher than the mean pre-test skill score of study subjects (2.98.± 2.646) with mean difference of (6.740) regarding care of chest tube drainage The mean difference was statistically significant(p<0.001). This indicates that the 'demonstration on skill regarding care of chest tube drainage was effective in increasing the skill score of staff nurses regarding care of chest tube drainage.

These findings are consistent with the study conducted by Reda Abdel Salam Ibrahim and Monera Elshemy[48]- 2016 to assess knowledge, practice of 40 nurses regarding care of chest tube and to evaluate the impact of educational program on knowledge and practices of nurses about caring of patient with chest tube. Total performance level of practice was unsatisfactory less than 60% in pre-program implementation, while immediate post program 40% of studied nurses had satisfactory performance.

Hence, it is evident that post-test skill scores of study subjects were higher than the pre-test skill scores. The lack of skill among the staff nurses can be due to lack of practice and lack of in service education. This suggests that there should be an in-service programme for nurses regarding the care of chest tube drainage so that they may remain updated with the recent advances in management of patients with chest tube drainages. These in-service programmes will also prepare better nurses which in turn can reduce the development of complications among patients with chest tube drainage.

Objective 8: To associate the pre-test skill scores with selected demographic variables (Gender, Professional qualification, Years of working experience)

Findings of the present study revealed that there was statistically significant association of the pre-test skill scores with the professional qualification and years of experience of the study subjects at (p=0.000) These findings are consistent with the findings of a study conducted by Badria A. Elfaki, Hassanat E. Mustafa, Alaadin Hassan Ahmed[33] 2016 to assess nurses knowledge and practice among (50) nurses employed in Sudan Heart Centre hospital· which showed that the nurses with master degree and experience more than 5 years had significant high level of skill than those with bachelor degree and experience from 1-5years (P-value < 0.05). Present study showed that there is no significant association of pretest skill score with gender.

Summary of Major Findings and Conclusion:
This chapter gives a brief summary of the dissertation, identify the main methods used and discuss their implications. The present study was aimed to assess the Effectiveness of self-instructional module on knowledge and demonstration on skill regarding care of chest tube drainage among staff nurses at SKIMS Hospital Soura Srinagar Kashmir

Major findings of the study
Findings related to description of demographic variables
Most of the study subjects i.e., 31 (62%) were females while as 19(38%) were males.
Maximum number of the study subjects i.e., 26(52%) were B.Sc. nurses, 19(38%) were GNM, & 5 (10%) were M.Sc. nurses.
Most of the study subjects i.e., 23(46%) were having 1-5 years of experience while as 27(54%) were having 6-10 years of experience.

Findings related to pre-test and post-test knowledge regarding care of chest tube drainage
The findings revealed that most of the study subjects i.e., 24(48%) had poor knowledgein the pre-test whereas most of the study subjects i.e., 41(82%) had good knowledge in the post-test. There was a significant increase in the knowledge scores regarding care of chest tube drainage in post-test after administration of self-instructional module. Thus, self-instructional module was found to be effective in increasing the knowledge regarding care of chest tube drainage.

Findings related to comparison of pre-test and post-test knowledge of study subjects regarding care of chest tube drainage
The findings reveal that the mean difference between the pre-test and the post-test knowledge scoreswas (9.300) regarding care of chest tube drainage which was found to be significant ($p<0.001$). Hence null hypothesis (H_{01}) was rejected and research hypothesis (H_1) was accepted which states that the mean post-test knowledgescore of study subjects regarding care of chest tube drainage is significantly higher than the mean pre-test knowledge score at 0.05 level of significance. It provides evidence that the self instructional module was effective in improving the knowledge regarding care of chest tube drainage among staff nurses.

Findings related to association of pre-test knowledge score of study subjects regarding care of chest tube drainage with the selected demographic variables (Gender, professional qualification & years of working experience)
The association of demographic variables with pre-test knowledge score revealed that there was significant association of pre-test knowledge scores with variables such as professional qualification, and years of experience, while as no association was found between pre-test knowledge score with gender. Hence the researcher rejected the null hypothesis (H03) for professional qualification and years of working experience while as accepted for gender variable at $p<0.05$ level of significance.
Findings related to pre-test and post-test skill regarding care of chest tube drainage: The findings revealed that most of the study subjects i.e, 36(72%) had poor skill in the pre-test whereas most of the study subjects i.e, 45(90%) had good skill in the post-test. There was a significant increase in the skill scores regarding care of chest tube drainage in post-test after demonstration on skill regarding care of chest tube drainage. Thus, demonstration was found to be effective in increasing the skill sore regarding care of chest tube drainage
Findings related to comparison of pre-test and post-test and skill score of study subjects regarding care of chest tube drainage:
The findings reveal that the mean difference between the pre-test and the post-test skill scores was (6.740) regarding care of chest tube drainage which was found to be significant ($p<0.001$). Hence null hypothesis (H_{02}) was rejected and research hypothesis (H_2) was accepted which states that the mean post-test skill score of study subjects regarding care of chest tube drainage is significantly higher than the mean pre-test skill score at 0.05 level of significance. It provides evidence that the demonstration was effective in improving the skill score regarding care of chest tube drainage among staff nurses.

Findings related to association of pre-test skill score of study subjects regarding care of chest tube drainage with the selected demographic variables (Gender, Professional qualification & Years of working experience)
The association of demographic variables with pre-test skill score revealed that there was significant association of pre-test skill scores with variables such as Professional qualification, and Years of working experience, while as no association was found between pre-test skill score with gender. Hence the researcher rejected the null

hypothesis (H04) for professional qualification and years of working experience while as accepted for gender variable at p<0.05 level of significance.

V. Conclusion:

The staff had alack of adequate knowledge and skill regarding care of chest tube drainage and there is a need for educating the staff nurses.

The mean knowledge and skill scores improved after administration of self-instructional module and demonstration indicating that self-instructional module and demonstration was effective in increasing the knowledge and skill scores.

Except for the gender, there was significant association between pre-test mean knowledge and skill scores and the selected demographic variables professional qualification and years of experience indicating that the demographic variables have effect on the knowledge and skill scores. Therefore, the study concluded that administering self-instructional module and demonstration are effective in increasing the knowledge and skill score of staff nurses regarding care of chest tube drainage.

Nursing Implications

The finding of the present study has implications in the field of nursing education, nursing practice, nursing administration and nursing research.

Nursing Education

1.   Educators will help students, colleagues, and junior staff to be trained in chest tube drainage management.
2.   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.
3.   The self-instructional module could help educator to use it as a tool for teaching.
4.   Orientation programs regarding care of chest tube drainage can be introduced and the student nurses and newly recruited staff could be encouraged to participate in such programs.

Nursing practice

1.   Knowledge regarding care of chest tube drainage is absolutely essential for safe nursing practice. This knowledge will help the staff nurses to protect patients from various complications related to chest tube drainage.
2.   In-service training programs regarding care of chest tube drainage   can be introduced in hospitals on regular basis.
3.   Self-instructional module, pamphlets etc can be used to help the staff nurses to update their knowledge at their own pace and place.

Nursing administration

1.   Nursing is a dynamic profession, and staff development is an integral part of nursing administration.
2.   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.
3.   Necessary administrative support should be provided for preparing educational materials for various nursing procedure.
4.   It will help the nursing administrators to plan and organize continuing education programme for nurses and others and for applying and updating the knowledge on care of patient with chest tube drainage.
5.   Nursing conferences, group discussion, etc can be conducted by the administrators periodically.

Nursing research

1.   The findings of the present study serve as the basis for the professionals, nurses and students to conduct further studies.
2.   The findings of the study have added to the existing body of the knowledge in the care of patient with chest tube drainage.
3.   Other researchers may utilize the suggestions and recommendations for conducting further study.
4.   Studies conducted by the researchers reveal that chest tube drainage can cause many complications among patients with chest tube drainage. So, studies should be carried out focussing on imparting knowledge and practice of staff nurses regarding care of chest tube drainage
5.   The findings of the study help the professional nurses and students to develop inquiry for further research.
6.   There is need to have evidence based research for every researcher.

7.   The study will motivate the initial researchers to conduct the same study on large scale

Limitations
1.   The study is limited to the 50 staff nurses of SKIMS Hospital Soura Srinagar, which limits the generalization.
2.   There was no control group
3.   Retention of knowledge of staff nurses was not measured.

VI. Recommendations

Keeping in view the findings of present study, the following suggestions were made
1.   The studies can be replicated on larger samples in a different setting to validate the findings and for generalization.
2.   A similar study can be done to assess the practice of care of patient with chest tube drainage among staff nurses.
3.   A similar study can be conducted using true experimental design.
4.   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.
5.   An exploratory study to find out the factors that hinder the nurses in providing care for patients with chest tube drainage among staff nurses.
6.   An exploratory study to find out the difficulties experienced by the nurses in providing care to the patient with chest tube drainage.
7.   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.

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