Impact of a Structured Training Program Regarding Care of Patients with Chest Tube Drainage in Terms of Knowledge and Practices of Nurses Working in a Tertiary Care Cancer Center in North India

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ABSTRACT

Introduction: A chest tube (hollow, flexible drainage tube) placement is a procedure in which a tube is inserted by an aseptic technique through the side of the chest wall into the pleural space. The complication rate in patients with ICD has been found high, resulting from inadequate knowledge of thoracic anatomy or/and insufficient clinical training and experience.

Objective: Assessing the efficacy of a structured Clinical training program regarding the care of patients with chest tube drainage, assessing existing and gained knowledge and practices level, and finding the association between the sociodemographic variables and knowledge and practices.

Material and Methods: In this Prospective study, 200 nurses participated in the study; pre-test and Post-test research designs were applied in this study. Data collection was done by using of probability random sampling technique.

Result: The Pre-test Mean knowledge score was 8.77 with a standard deviation of 2.08 and the Mean practical knowledge score was 7.6 with a standard deviation of 2. When participants' knowledge and practices were checked before the training program, 58 % (116) subjects had Good Knowledge, 22.5 % (45) had average knowledge, 17.5 % (35) had excellent knowledge, and 2 % (4) had poor knowledge scores. When participants' practical knowledge was checked before the training program, 49 % (98) subjects had good practice scores, 43 % (86) had average practice scores, 5.5 % (11) had excellent practice scores, and 2.5 % (5) had poor practice scores. Posttest mean knowledge score was 10.56 with a standard deviation of 1.86. Posttest mean Practical knowledge score was 10.57 with a standard deviation of 2.26. After the structured clinical training program, 57.5 % (23) had an adequate knowledge score, 40 % (16) had a moderate level of knowledge score, and 2.5 % (1) had inadequate knowledge. After the structured clinical training program, 50 % (100) had an excellent practice score and 42 % (84) had a good practice score, and 8 % (16) had an average practice score. An association was found between existing knowledge score and marital status, between post-test knowledge and Religion as calculated p-values of the Fisher Exact test that is 0.036, 0.017 is smaller than the alpha value 0.05. In the Practical Knowledge score, an association between pre-test practice scores and the number of previous ICD training was found, as the calculated p-value of the

fisher Exact test 0.04 was smaller than the alpha value of 0.05.

Conclusions: In the care of a patient who has an Inter-costal chest tube, need much attention as comparing other, because the handling of the ICD tube and bag, emptying of a bag, and transportation of the ICD patient need careful action. In our study, we found that existing knowledge and Practice of ICD care procedures are not satisfactory with the traditional teaching approach, bedside clinical training is a beneficial approach that will significantly improve the Knowledge and Knowledge in practice.

Keywords: ICD Care, Intercostal drainage, Chest tube care, Thoracic tube care

INTRODUCTION

Intercostal Chest tube drains are constantly faced by the nursing officer in their clinical practice (1). Chest tube insertion is generally carried out in medical, surgical, and critical care specialties from bedside to operating room, from life-threatening emergencies to postoperative chest drainage in elective surgery (2). A chest tube insertion is an aseptic procedure in which a hollow, flexible drainage tube is inserted through the side of the chest in the pleural space. Pneumothorax, haemothorax, emphysema, and pleural effusion is the common indication for inserting an intercostal drainage tube (3). The concept of chest drainage was first described by Hippocrates when he portrayed the treatment of empyema employing incision, cautery, and insertion of metal tubes (4). Insertion of the chest drain is the physician's responsibility, using complete aseptic precautions. Nurses are responsible for maintenance of the underwater sealed drainage and appropriate suctioning, recording & Reporting of the drain output, Dressing of wound site, and pain management, educating and supporting the patient. Nurses should have the problem-solving skill and good knowledge regarding ICD while Caring for a patient with a chest tube. Nursing care is mainly directed at maintaining patency and properly functioning the chest tube drainage system. Therefore, nurses must comprehensively understand the chest tube drainage system's operations and pay special attention to reducing the complications arising from chest tube drainage. The rate of complications in patients with chest tubes has been reported as high as 30%. Even with the enormity of its clinical function, this procedure carries significant preventable morbidity (5). Complications can result from inadequate knowledge of thoracic anatomy or insufficient training and experience (6). Teaching and learning are integral parts of nursing. Nurses are responsible for educating patients about various aspects and keeping themselves updated. This study aims to assess nurses' knowledge and practices regarding inter-costal drainage care and explore preferred methods for updating knowledge on chest drain management. Several complications can occur when managing a patient with a chest tube due to the carelessness of healthcare professionals. Nurses must receive the appropriate training in managing chest drains and ensure that patients are cared for safely and competently.

Aim of the Study: To assess nurses' knowledge and practices and explore preferred methods of keeping updated about chest drain management.

Objective: -
1. The primary objective of the study was to evaluate the efficacy of a structured Clinical training program regarding the care of patients with chest tube drainage.
2. The Secondary objectives of the study were evaluating existing and obtained knowledge and practices regarding the care of patients with chest tube drainage and finding the association between the sociodemographic variables and knowledge & practices of staff nurses.

MATERIAL AND METHODS

In this Prospective study, 200 nurses participated in the study; pre-test and Post-test research designs were applied in this study. Data collection was done by using of probability random sampling technique. Subjects who fulfilled the inclusion criteria were selected as participants. After explaining the purpose of the study, informed consent was obtained from the participants, and a self-structured questionnaire was delivered to participants. The questionnaire was cross-checked for any missing data or incompleteness. Data tabulation was done for statistical analysis.

RESULT

The Pre-test Mean knowledge score of subjects was 8.77 with a standard deviation of 2.08 and Pre-test Mean practical knowledge score was 7.6 with a standard deviation of 2. Posttest mean knowledge score was 10.56 with a standard deviation of 1.86 and the Posttest mean Practical knowledge score was 10.57 with a standard deviation of 2.26.

Regarding the Sociodemographic profile of participants, (Shown in table 1), the majority of subjects, 84 % (168), belonged to the 20 -30-year age group, and 16 % (32) subjects belonged to the 31–40-year age group.

Regarding gender 77.5 % (155) were female and 22.5% (45) were male.

In terms of education, the majority of participants, 84.5 % (169), were having B.sc Nursing degree, 14 % (28) had a general nursing midwifery diploma, and only 1.5 % (3) had M.Sc. Nursing degrees.

Regarding marital status, 61.5 % (123) were unmarried, and 38.5 % (77) were married.

Regarding jobs, 67.5 % (135) subjects were ad-hoc Contract employees, and 32.5 % (65) were regular employees.

Regarding clinical experience, 46.5 % (93) of the subjects had 1 to 2 Years of experience, 20 % (40) had 3 to 4 years of experience, 18 % (36) had 5 to 6 years of experience, 11% (22) had 7 to 8 years of experience, and only 4.5 % (9) had above than nine years of clinical experience.

Regarding the type of family, 59.5 % (119) had a single type family, and 40.5 % (81) had a Joint type family.

Regarding the Area of Living the majority of participants, 81.5% (163) lived in urban areas, and 18.5% (37) lived in rural areas.

In terms of Religion, the majority of participants, 87.5 (175), were Hindu, 9.5 % (19) were Christian, 2 % (4) were Muslims, and 0.5 % were Baudh and Sikh.

In the matter of number of previous ICD training attendance, the majority of participants, 81 % (162), were not joined any ICD training session previously, 16 % (32) attended only 01 training session, and 1.5 % (3) participated in 2 training, 1.5 % (3) participant attended more than two ICD training session previously.

Table 1 Sociodemographic distribution of Subjects [N = 200]

S. No.	Variable	Frequency	Percentage
	Age in Years		
1.1	20-30	168	84.0
1.2	31-40	32	16.0
	Gender		
2.1	Female	155	77.5
2.2	Male	45	22.5
	Education level		
	B.Sc	169	84.5
	GNM	28	14.0
	M.Sc	3	1.5
	Marital status		
	Married	77	38.5
	Unmarried	123	61.5
	Type of Job		
	Contract	135	67.5
	Regular	65	32.5
	Clinical experience		

	1 - 2 Year	93	46.5
	3 - 4 Year	40	20.0
	5 - 6 Year	36	18.0
	7 - 8 Year	22	11.0
	9 Years & Above	9	4.5
	Type of Family		
	Joint	81	40.5
	Single	119	59.5
	Area of Living		
	Rural	37	18.5
	Urban	163	81.5
	Religion		
	Buddhist	1	.5
	Christin	19	9.5
	Hindu	175	87.5
	Muslim	4	2.0
	Sikh	1	.5
	Intercostal Drainage Care training attendance		
	No training Session	162	81.0
	1.0	32	16.0
	2.0	3	1.5
	More than 02 sessions	3	1.5

Regarding Existing Knowledge, 58 % (116) subjects had Good Knowledge, 22.5 % (45) had average knowledge, 17.5 % (35) had excellent knowledge, and 2 % (4) had poor knowledge scores.

Table 2 Existing knowledge level [N = 200]

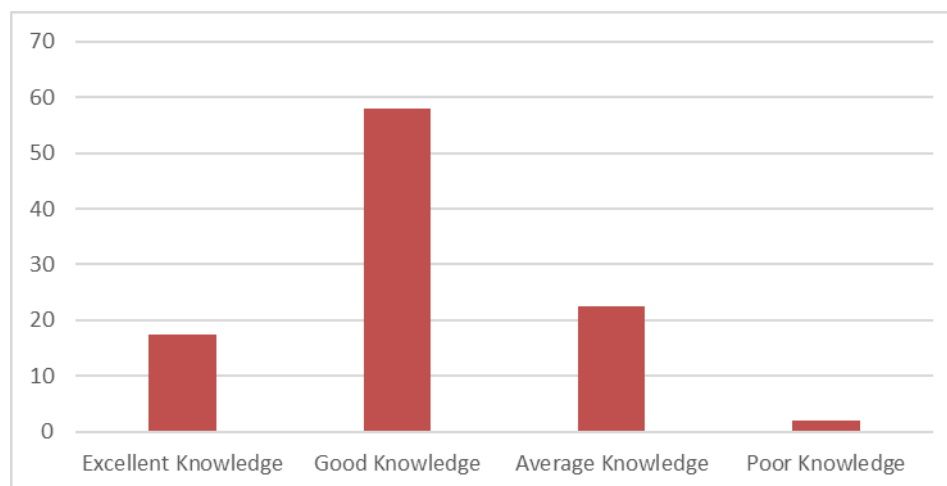| S. No.	Level of Knowledge	Frequency	Percent
1	Excellent Knowledge	35	17.5
2	Good Knowledge	116	58.0
3	Average Knowledge	45	22.5
7	Poor Knowledge	4	2.0

Figure 1 Existing level of knowledge

Regarding the Existing Practice level, 49 % (98) subjects had good practice scores, 43 % (86) had average practice scores, 5.5 % (11) had excellent practice scores, and 2.5 % (5) had poor practice scores.

Table 3 Existing level of Practice Score [N = 200]

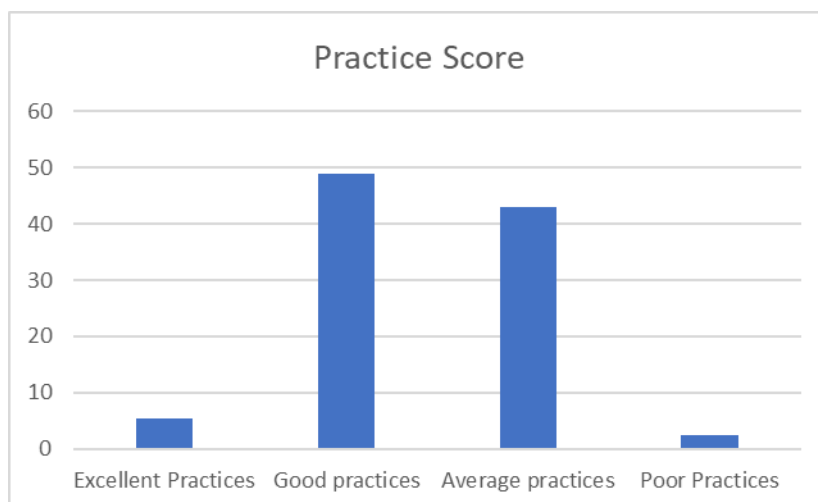| S.No.	Level of Practice	Frequency	Percent
1	Excellent Practices	11	5.5
2	Good practices	98	49
3	Average practices	86	43
4	Poor Practices	5	2.5

Figure 2 Existing practice level

Knowledge after the clinical training program, after the structured clinical training program, 58 % (116) had excellent knowledge, 34.5 % (69) had a piece of good knowledge, and 7.5 % (15) had average knowledge, none of having poor knowledge.

Table 4 Gained knowledge score [N = 200]

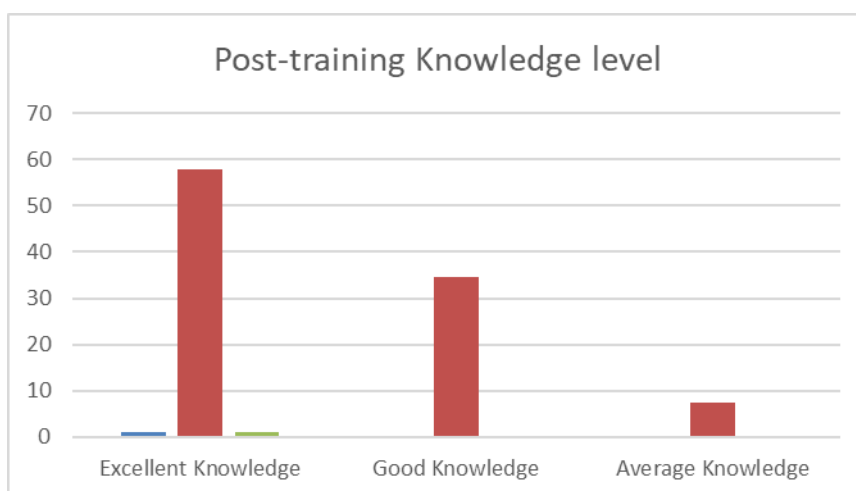| S. No.	Level Of Knowledge	Frequency	Percent
1	Excellent Knowledge	116	58.0
2	Good Knowledge	69	34.5
3	Average Knowledge	15	7.5

Figure 3 Post-training Knowledge level

Practical knowledge after the clinical training program, 50 % (100) of the subject had an excellent practice score and 42 % (84) had a Good practice score, and 8 % (16) had an average practice score.

Table 5 Gained Practice score [N = 200]

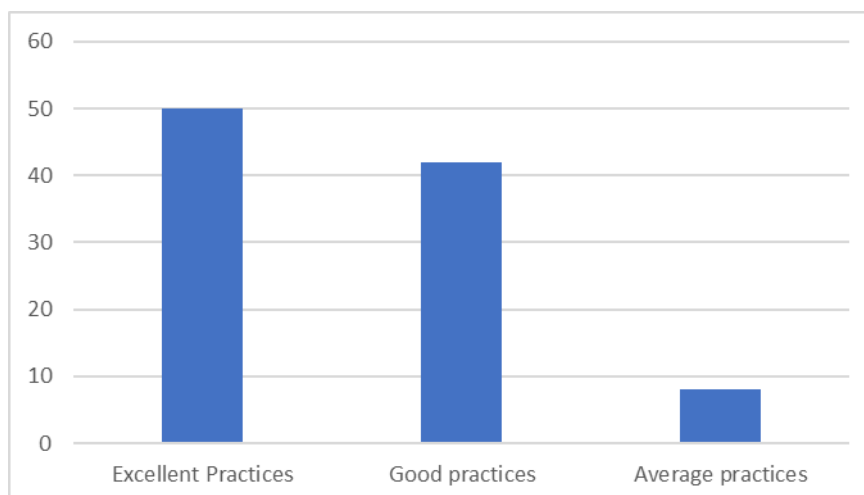| S. No.	Level of Practice	Frequency	Percent
1	Excellent Practices	100	50.0
2	Good practices	84	42.0
3	Average practices	16	8.0

Figure 4 Post-test practice level

Comparison of knowledge Score based on Criteria of Knowledge

In this study, only 17.5 % of the subject had excellent knowledge which increased to 58 % after the clinical training program and 22.5 % subject average knowledge, and 2 % had poor knowledge in the pre-test, percentage of this is decreased, which showing that subject gained knowledge regarding ICD care.

Table 6 Analysis of knowledge score

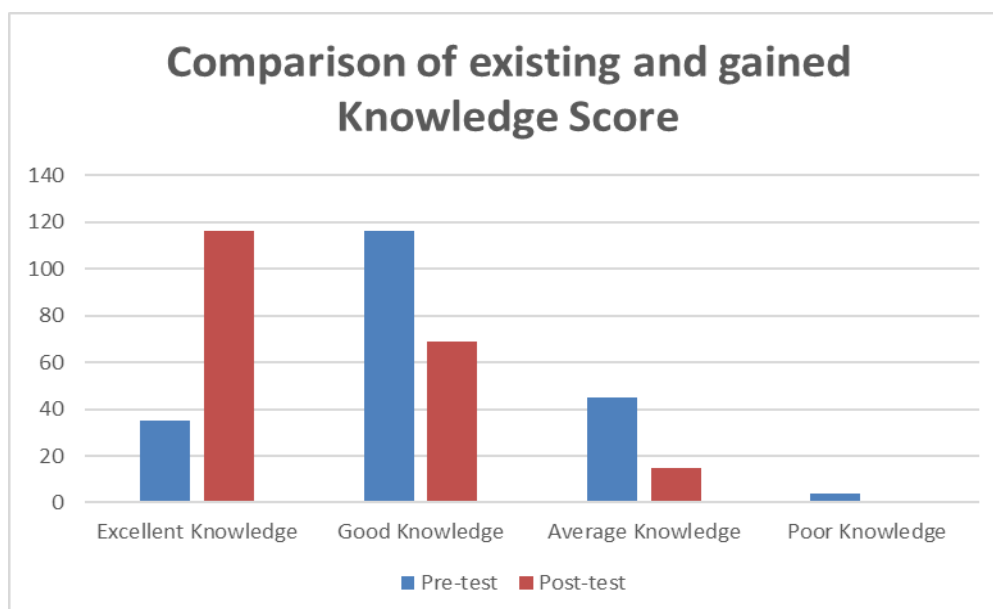| S. No.	Level of Knowledge	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
	Excellent Knowledge	35	17.5 %	116	58 %
	Good Knowledge	116	58 %	69	34.5 %
	Average Knowledge	45	22.5 %	15	7.5 %
	Poor Knowledge	4	2 %	0	0

Figure 5 Comparison of existing and gained Knowledge Score

Comparison of Practice score

In this study, as shown in Table 7, the majority of participants 50 % (100) subjects improved their practice scores, and in the pre-test, only 5.5% (11) had excellent practice scores.

Table 7 Analysis of Practice score

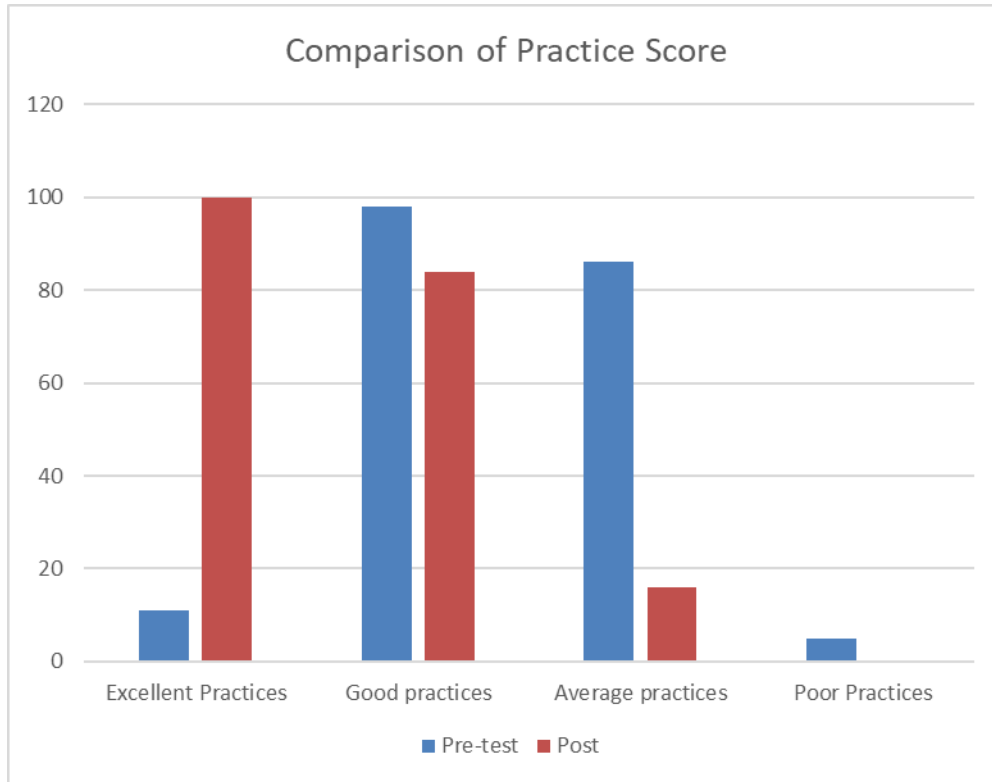| S.No.	Level of Practice	Pre-Test		Post- Test	
		Frequency	Percentage	Frequency	Percentage
	Excellent Practices	11	5.5	100	50.0
	Good practices	98	49.0	84	42.0
	Average practices	86	43.0	16	8.0
	Poor Practices	5	2.5	0	0

Figure -6 Comparison of Practice Score

Effectiveness of Structured Clinical Training Program

In Knowledge - In the present study, the t value in paired t-test was (Depicted in Table 8) 9.2, which was higher than the critical value of 1.97 (df 199), which presents the effectiveness of the training program.

Table 8 Effectiveness of training program in Knowledge level [N = 200]

Test	Mean	Std Dev	Std Err	T	df	t-crit	At 95 % Confidence interval		Sig. at 0.05
							lower	upper	
Pre-test	8.77	2.08							
Post-test	10.57	1.86							
Difference	1.8	2.78	0.197	9.2	199	1.97	1.4	2.19	yes

In Knowledge on Practice - In the present study, the t value in paired t-test was (Depicted in Table 9) 14.9, which was higher than the critical value (df 199) 1.97, which presents the effectiveness of the training program.

Table 9 Effectiveness of training program at the practice level [N = 200]

Test	Mean	Std Dev	Std Err	t	Df	t-crit	At 95 % confidence interval		Sig 0.05
							lower	Upper	
Pre-test	7.61	2.01		14.9		1.97	2.57	3.36	
Post-test	10.6	2.26							yes
Difference	2.97	2.81	0.2		199				

Table 10 Association between the knowledge score and sociodemographic variables. (N = 200)

S. No	Sociodemographic data	Pre – Test		Post-test	
		p-value (Fisher exact)	Significance at 0.05	p-value (Fisher exact)	Significance at 0.05
1.	Age in Years	0.432	> 0.05	0.512	> 0.05
2.	Gender	0.23	> 0.05	0.229	> 0.05
3.	Education level	0.05	> 0.05	0.112	> 0.05
4.	Marital status	0.036**	< 0.05	0.495	> 0.05
5.	Type of Job	0.203	> 0.05	0.628	< 0.05
6.	Clinical experience	0.638	> 0.05	0.649	> 0.05
7.	Type of Family	0.40	> 0.05	0.336	> 0.05
8	Area of Living	0.992	> 0.05	0.122	> 0.05
9	Religion	0.675	> 0.05	0.017**	< 0.05
10	ICD training	0.775	> 0.05	0.7	> 0.05

Association between Knowledge and Sociodemographic picture

Regarding the association between sociodemographics and pre-test knowledge, score association was found between marital status as calculated p-value of Fisher Exact test that is 0.036 is smaller than the alpha value 0.05. (Shown in table 10).

Regarding the association between sociodemographics and pre-test knowledge, score association was found between Religion as calculated p-value of the Fisher Exact test that is 0.017 is smaller than the alpha value 0.05. (Shown in table 10).

Table 10 Association between the knowledge score and sociodemographic variables. (N = 200)

S. No	Sociodemographic data	Pre – Test		Post-test	
		p-value (Fisher exact)	Significance at 0.05	p-value (Fisher exact)	Significance at 0.05
1.	Age in Years	0.96	> 0.05	0.875	> 0.05
2.	Gender	0.549	> 0.05	0.287	> 0.05
3.	Education level	0.766	> 0.05	0.462	> 0.05
4.	Marital status	0.465	> 0.05	0.86	> 0.05
5.	Type of Job	0.821	< 0.05	0.594	< 0.05
6.	Clinical experience	0.5	> 0.05	0.574	> 0.05
7.	Type of Family	0.111	> 0.05	0.452	> 0.05
8	Area of Living	0.854	> 0.05	0.9	> 0.05
9	Religion	0.645	> 0.05	0.428	> 0.05
10	ICD training	0.047**	< 0.05	0.417	> 0.05

Association between practical knowledge Score and Sociodemographic picture

The association between sociodemographics and pre-test practice score was found, as the calculated p-value of the Exact fisher test in ICD training 0.04 was smaller than the alpha value of 0.05. (Shown in table 11).

Regarding the association between sociodemographics and post-test practice score, no association was found as the calculated p-value of the Fisher Exact test was more significant than the alpha value of 0.05 in all variables. (Shown in table 11).

DISCUSSION

This prospective study rendered the effectiveness of structured bedside clinical training programs and the requirement of refinements in current training practices. This study suggests, to provide quality service to patient, excellent knowledge and skill is required for nurses which can be gained through the development and organization of clinical education programs, The incorporation of evaluation in training is a form of quality indicator in the future. Structured Bedside clinical training programs are necessary for nurses working in all clinical as well as procedural regions such as OPDs, IPD, ICU, and Operation theatre to improve their skill and technical competency (7). A clinically skilled and technically competent nurse may decrease the rate of complications in ICD patients (8).

CONCLUSIONS

For providing quality care to ICD patients, excellent knowledge and Practice regarding ICD care procedures are required which may not be fulfilled by the traditional teaching approach. Regular bedside clinical training will significantly improve the Knowledge and Knowledge in practices; hence, continuing nursing education regarding the care of patients with intercostal drainage is highly recommended.

REFERENCES

1. Claire Magner, Catherine Houghton, Margie Craig, and Seamus Cowman. Nurses' knowledge of chest drain management in an Irish Children's Hospital. Journal of Clinical Nursing. 2013; 22: p. 2912–2922.
2. Michael Kwiatt, Abigail Tarbox, Mark J. Seamon, Mamta Swaroop, James Cipolla, Charles Allen, Stacinoel Hallenbeck, H. Tracy Davido, David E. Lindsey, Vijay A. Doraiswamy, Sagar Galwankar, David Tulman. Thoracostomy tubes: A comprehensive review of complications and related topics. International Journal of Critical Illness and Injury Science. 2014 Apr-Jun ; 4(2): p. 143-155.
3. Lovely SS. A pre-experimental study to assess the effectiveness of a structured interventional program on knowledge regarding care. International Journal of Advance Research, Ideas, and Innovations in Technology. 2020; 6(4): p. 147-156.
4. Fry W, Paape K. Shield's textbook of general thoracic surgery.
5. Aziz A., Pirzada M., Hider J., Alam S., and Malik K. Complications of tube thoracostomy in isolated chest injuries. Journal of Surgery Pakistan. 2010; 15(3): p. 126-130.
6. Dural K., Gulbahar G., Kocer B., and Sakinci U. A novel and safe technique in closed tube thoracostomy. Journal of Cardiothoracic Surgery. 2010 April 06; 5.
7. Armin Ernst, Momen M. Wahidi, Charles A. Read, John D. Buckley, Doreen J. Addrizzo-Harris, Pallav L. Shah, Lonny Yarmus, and Gerard A. Silvestri. Adult Bronchoscopy Training Current State and Suggestions for the Future: CHEST Expert Panel. CHEST. 2015 AUGUST; 148(2).
8. Anna Jakubczyc, Claus Neurohr. Diagnosis and Treatment of Interstitial Lung Diseases. Dtsch Med Wochenschr. 2018 Dec; 143(24): p. 1774-1777.

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