RESEARCH ARTICLE

IMPLEMENTATION OF INTERCOSTAL DRAINAGE CARE PROTOCOL FOR POST-OPERATIVE CARDIAC PATIENTS IN POST-OPERATIVE CARDIOTHORACIC ICU

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ABSTRACT

INTRODUCTION: Given the importance of nursing care in achieving positive patient outcomes, standardized measures are essential to evaluate and implement nursing interventions as well as quality improvement initiatives. Protocol based nursing care is an effective method in managing the patients with intercostal drains.

AIM: This study was undertaken to develop and implement a protocol on ICD care for nurses in cardio-thoracic ICU (CTVS ICU) and to evaluate the effectiveness of the same.

MATERIAL AND METHODS: A pre-test post-test design was used to assess the effectiveness of ICD protocol on nurses' knowledge and practice as well as patient care outcome. The study was conducted among 60 nurses and 175 post-operative cardiac patients, admitted in CTVS ICU. The study had 3 phases: protocol development, implementation and evaluation phase. The ICD care protocol was developed through 4 stages. During the implementation phase, the nurses were given a structured teaching program about the ICD care protocol. Knowledge and practice of nurses were assessed and compared before and two weeks after implementation of the protocol. Further, patient care outcome was assessed and compared between the pre-implementation phase (86 patients) and post-implementation phase (89 patients).

RESULTS: Knowledge of nurses have improved significantly after the implementation of ICD care protocol from 11.11±2.63 to 18.98±1.64 ($p<0.001$) and the practice score was improved from 4.98±1.33 to 6.61±1.00 ($p<0.001$). Pre-implementation patient care outcome score of 3.88±0.07 was significantly improved to 4.23±0.07 during the post-implementation phase ($p<0.001$).

CONCLUSION: It is concluded that implementation of ICD care protocol has improved the knowledge and practices of nurses related to ICD care as well as patient care outcome. These findings highlight the importance implementing standardized protocol to improve the nursing practice standards and positive patient care outcomes in post-operative patients of cardio-thoracic surgery with ICD.

KEYWORDS: Intercostal Drainage care protocol, nurses, post-operative cardiac patients.

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INTRODUCTION & BACKGROUND OF THE STUDY

Patients who undergo CABG, other open cardiac surgeries and pleural injuries necessitate the insertion of at least one intercostal drainage (ICD)[1]. The approach for tube insertion can be xiphoid or intercostal[2]. Tube displacement, blocked drain, malposition of tube, re-expansion pulmonary edema, subcutaneous emphysema etc. are the complications, which can occur after ICD insertion[3]. All nurses who care for patients with chest tubes should be knowledgeable about managing ICD[4].ICD care comes under the scope of nursing practice. It's important that nurses and doctors establish a fine balance between using policies and protocols related to ICD care to provide directions for standard care and practice to allow sufficient flexibility in addressing the complexities of care of patients with ICD[5]. Karishna and Ravindra [6] conducted a pre-experimental study to evaluate the effectiveness of planned teaching program on knowledge regarding ICD care among staff nurses and concluded that planned teaching program on ICD care was highly effective in improving nurse's knowledge related to ICD care. Emanuelle et al [7] conducted a retrospective cohort study to evaluate the impact of chest tube management protocol on outcome of trauma patients with tube thoracostomy and found that there was a significant reduction ($p<0.05$) in the incidence of retained hemothorax, empyema, pneumonia, surgical site infections, post-procedural complications, length of hospital stay and number of chest tube days after the implementation of protocol.

There was a felt need of protocol regarding ICD care. Previously,

there was no study conducted in our setting on nursing care of patients with ICD. Nurses had keen interest to know the protocol of ICD care. In order to provide care to patients with indwelling ICD, the nurses must also be familiar with normal physiology of breathing, components of intercostal drainage system and how they work. Therefore, present study was conducted to develop and implement intercostal drainage care protocol for patients in post-operative cardiothoracic intensive acre unit (CTVS ICU) and to evaluate the outcome of intercostal drainage care protocol in terms of nurses' knowledge, practices related to intercostal drainage care and patient care outcome.

MATERIAL AND METHODS

Research approach & Design: Present study used a pre-test post-test design and report results on implementation of intercostal drainage protocol in terms of nurses' knowledge, practices and patient care outcome.

Sample and sampling technique: This study involved 60 nurses and 175 patients in whom 86 patients were enrolled in pre-implementation phase and 89 patients were enrolled in post-implementation phase in CTVS ICU of AIIMS New Delhi by using total enumeration technique for nurses and convenient sampling for patients (Figure 1).

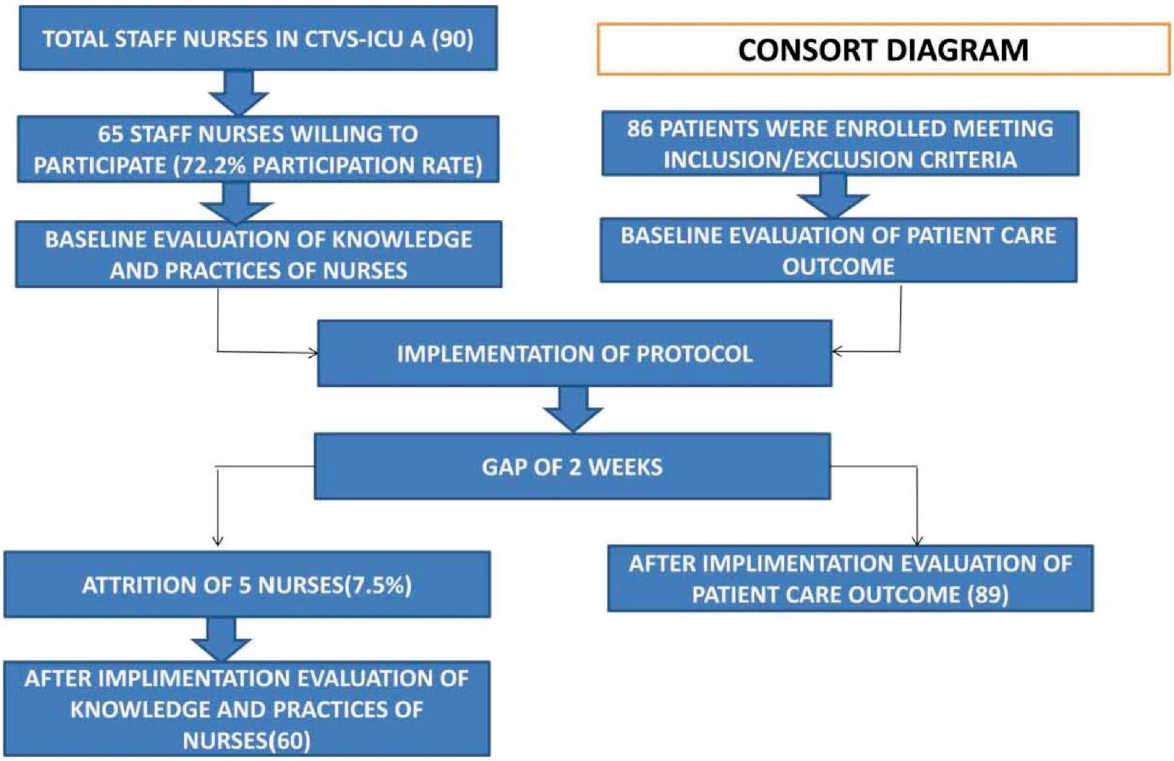

Fig 1 : Consort Diagram

Method of data collection: Nurses who were willing to participate, present at the time of data collection and who were involved in direct patient care in CTVS ICU were enrolled. Patients who stayed in CTVS ICU for more than 24 hours, willing to participate and retained at least one intercostal drain for at least 24 hours included in study. The patients who were not able to communicate and younger than 18 years were excluded.

Nursing protocol

The study process was adopted after extensive evidence-based literature review and it was done in 3 phases (Figure 2).

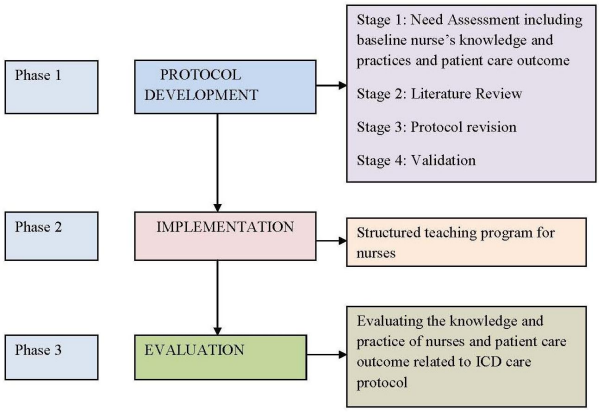

Figure 2: Illustration of study process

Intercostal drainage care protocol

It consists of five components: (1) introduction (2) indications (3) site of insertion (4) management of patient with ICD including the practices and recommendations (5) health education by nurses regarding pain management, deep-breathing exercise, discomfort, sleep and anxiety to patient. Researcher obtained the competency certificate for implementing the structured teaching program on ICD care. In the implementation phase ICU nurses attended the teaching program on ICD care by researcher. Total time taken for teaching session was 25-30 minutes and structured teaching program was repeated among staff nurses in small sessions of 3-5 nurses each. It was conducted in CTVS ICU during the duty hours.

EVALUATION

Data was collected from nurses by using demographic data sheet, structured knowledge questionnaire and self-developed checklist for assessment of practice. The data was collected from the patients using demographic data sheet and 5-point scale for measuring patient care outcome which was developed by researcher. All tools were validated and reliability was tested before using, tool try out was done.

ETHICAL CONSIDERATIONS

Appropriate ethical approval was obtained from Ethics Committee of AIIMS, New Delhi. The written informed consent was taken from study subjects.

RESULTS

Table 1
Socio-demographic characteristics of the nurses

N=60

Demographic variables		Mean± SD or f (%)
Age in years		30±4.38
Gender	Male	14 (23)
	Female	46 (77)
Professional qualification	G.N.M.	10 (17)
	P.C.B.Sc. (N)	8 (13)
	B.Sc. (N)	30 (50)
	M.Sc. (N)	12 (20)
Total professional work experience	<2 years	2 (3)
	2-5 years	26 (44)
	6-10 years	24 (40)
	>10 years	8 (13)
Ever cared for a patient having ICD	Yes	60 (100)

As shown in table 1, mean age of the nurses was 30±4.38 years. Majority of the nurses (77 %) were females and 50% of the nurses were having B.Sc. Nursing as their professional qualification. 44% of the nurses were having 2-5 year of working experience. Every nurse had cared for the patients having ICD before implementation of ICD care protocol.

Table 2

Demographic characteristics of the patients admitted in CTVS ICU during pre and post implementation phase of ICD care protocol

N=175

Demographic variables		**Pre-implementation phase (n_1 =86)**	**Post implementation phase (n_2 =89)**	**p-value**
Age (Years)[a]		**Mean ±SD**	**Mean ±SD**	
		58±12.4	62.2±8.1	0.029*
		Frequency (%)	**Frequency (%)**	
Gender[c]	Male	69(80)	59 (66)	0.074
	Female	17 (20)	30 (33)	
Religion[c]	Hindu	36 (40)	34 (38)	0.707
	Muslim	20(25)	22 (25)	
	Sikh	16(19)	22 (25)	
	Other	14(16)	11(12)	
Education[c]	Illiterate	25 (29)	15 (17)	0.124
	Primary	27 (32)	29 (33)	
	Secondary	24 (27)	38 (42)	
	Graduate	10 (12)	7 (8)	
Income (Rs.)[b]	5,000-10,000	30 (35)	40 (45)	0.462
	10,001-20,000	34 (40)	32 (36)	
	20,001-30,000	13 (15)	12 (14)	
	>30,000	9 (10)	5 (6)	
Post-Operative day[b]	Day 2	65 (75)	48 (54)	0.007*
	Day 3	18 (21)	34 (38)	
	Day 4	2 (3)	7 (8)	
	Day≥5	1 (1)	0 (00)	
Previous surgery[c]	Yes	29 (34)	30 (34)	0.563
	No	57(66)	59 (66)	
No. Of ICD drain[b]	1	18(21)	16(18)	0.795
	2	64(74)	67(76)	
	3 or more	4(4)	6(6)	

a-Independent t test, b- pearson chi^2 test/ fisher exact test, c- pearson chi^2 test *Significant at $p<0.05$

Table 2 represents that mean age in pre-implementation patient group was 58±12.4 years whereas in post-implementation it was 62.2±8.1 years (p=0.029). Majority (75%) of the patients enrolled on 2nd post-operative day during pre-implementation phase, but only 54% of patients were enrolled on 2nd post-operative day in post-implementation patient group (p=0.007). majority of the patients in both the groups had two ICDs.

Table 3

Comparison of knowledge of nurses pre and post implementation of ICD care protocol

N=60

Study phase	**Knowledge score Mean ± SD**	**p-value** (Paired t-test)
Pre-implementation	11.11±2.63	<0.001*
Post-implementation	18.98±1.64	

*Significant at p≤0.05

As shown in table 3, there was significant improvement in knowledge score of nurses as the post implementation knowledge score of 18.98±1.64 is significantly higher than pre-implementation knowledge score of 11.11±2.63 (p<0.001).

Table 4

Comparison of practice scores pre and post implementation of ICD care

N=60

Study phase	**Practice score Mean± SD**	**p-value** (Paired t-test)
Pre-implementation	4.98±1.33	p<0.001*
Post-implementation	6.61±1.00	

*Significant at p<0.05

As shown in table 4, the mean practice score before the implementation of ICD care protocol was 4.98±1.33, which was improved to 6.61±1.0 after the implementation of ICD care protocol, with a level of significance of p<0.001.

Table 5

Comparison of patient care outcome pre and post implementation of ICD care protocol

N=175

Variables	**Patient care outcome score**		**p-value**
	Pre-implementation	**Post-implementation**	
	Mean± SD	**Mean± SD**	
Overall patient care outcome	3.87±0.73	4.24±0.58	<0.001*
	Mean± SE	**Mean± SE**	
Overall patient care outcome#	3.88±0.07	4.23±0.07	<0.001*

*Significant at p<0.05

Regression analysis using ANCOVA test

Table 5 shows the comparison of patient care outcome. As the groups were not comparable in terms of days after surgery, regression analysis was done using ANCOVA. Pre-implementation patient care outcome score after adjustment was 3.88±0.07 which was improved significantly to 4.23±0.07 ($p<0.001$). Thus, it can be interpreted that there was improvement in patient care outcome after the implementation of ICD care protocol.

DISCUSSION

The knowledge of nurses related to ICD care was improved after the implementation of intercostal drainage care protocol ($p=0.001$). The present study finding is congruent to the findings of Soge et al (2012)[8], Krishna et al (2015)[6], Lehwaldt et al (2005)[9] who found the implementation of structured teaching program improved the knowledge of nurses related to ICD care ($p<0.001$).The knowledge and practices related to ICD care was found to be poor among 50% of the nurses in the present study which was found to be similar with the findings of Jassim et al (2015)[10] who reported poor knowledge and practices of nurses related to care of patients with ICD.

The present study was undertaken after the interviews of nurses from CTVS units regarding the availability of any standard guidelines or protocol. The result of interviews revealed that nurses felt the need of standard guidelines for caring patients with ICD. The findings are in line with the findings of Nasser et al (2011)[11] who concluded that majority of the nurses felt the need of standard protocol and expressed that they had inadequate training for caring a patient with ICD.

Pain management is an important aspect of patients care outcome[12,13]. In present study, there was improvement in knowledge and practices score of nurses with the implementation of protocol based care ($p<0.001$). These findings are in line with the findings of Saranya (2014)[14], Ryan et al (2014)[15], who reported that the implementation of pain assessment protocol increased the knowledge and practices of nurses ($p<0.001$).

The protocol was implemented among nurses to improve their knowledge and practices which in turn positively affects the patient care outcome ($p<0.001$). Similar findings were reported by Alan et al (1999)[16] that there was significant improvement in patient care outcome in terms of days of hospital stay and duration of mechanical ventilation with the implementation of protocol based care by nurses ($p<0.001$). In the present study, patient care outcome was improved significantly ($p<0.001$) after implementation of ICD care protocol. Similar findings were reported by Emanuelle et al (2015)[7] there was significant improvement ($p<0.001$) in the outcome of the patients after the implementation of tube thoracostomy protocol. A protocol-based care helps in improving the patient outcome and long-term quality of life[17,18]. The complications such as retained hemothorax, empyema, pneumonia, surgical site infections, were reduced.

CONCLUSION

It is concluded that implementation of ICD care protocol has improved the knowledge and practices of nurses related to ICD care as well as patient care outcome. These findings highlight the importance implementing standardized protocol to improve the nursing practice standards and positive patient care outcomes in post-operative patients of cardio-thoracic surgery with ICD. There was a felt need by nurses for a standard protocol of caring patients with intercostal drainage. Patient care outcome improved after educating and implementing ICD protocol.

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