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Impact of an Education intervention on knowledge regarding Chest Tube among Resident Surgeons and Nurses

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The authors declare that there is no conflict to interest.

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A B S T R A C T

Background: The primary responsibility of the resident surgeon, followed by nurses, is caring for patients, with chest tube drainage, is chest tube management. The current study was conducted to assess the impact of educational intervention on chest tube management among resident surgeons and nurses.

Methodology: The resident surgeons and nurses working in Hayatabad medical complex, Peshawar, Pakistan, and willing to participate in the current study were recruited. The study was conducted between January 2020 and September 2020. The pre- and post-intervention data were collected using a self-developed validated questionnaire. The parametric test was applied as the data was normally distributed. Descriptive statistics were applied to explore the study variables

Results: The knowledge of the participants was significantly improved regarding the position of the drainage bottle ($p<0.0001$), chest tube insertion ($p=0.007$), and the importance of the chest tube in pneumothorax ($p=0.001$). Moreover, the knowledge of the participants was greatly enhanced by education intervention about the use of analgesics in relieving pain ($p>0.0001$) and the correct use of the Heimlich valve ($p>0.0001$). Overall, the education intervention significantly influenced the study participants' knowledge.

Conclusion: The study showed that education intervention significantly improved the knowledge regarding chest tube. The overall knowledge of the study participants was satisfactory after the intervention.

Key words: Chest Tube; Education Intervention; Knowledge; Resident Surgeon

Introduction

The lungs are a pair of organs in the thoracic cavity responsible for breathing. The conditions affecting the thoracic cavity vary from acute to chronic conditions. Many of these conditions are severe and life-threatening.[1] For instance, if hemothorax occurs due to chest trauma or thoracic surgery, the intrapleural pressure rises, resulting in respiratory failure. Chest tube drainage is an essential treatment for this condition.[2]

A chest tube insertion is a surgical operation in which a hollow, flexible drainage tube is introduced through the side of the ribs into the pleural space to drain air, blood, pus, or lymph from the pleural cavity. The water seal container linked to the chest tube permits air and fluid to leave the pleural chamber in only one direction.[3] The primary responsibility of nurses caring for patients with chest tube drainage is chest tube management, which entails maintaining the tube's appropriate functioning. A professional nurse invests in lifelong learning that impacts practice and, ultimately, patient care quality. The technical and critical thinking abilities of the nurse are insufficient to maintain an evidence-based practice.[4]

The prevalence of spontaneous pneumothorax is between 4 and 9 per 100,000 patients per year, with a male predominance (1 in 5). A 16% mortality has been observed related to pneumothorax. Here, complete lung expansion must be achieved, which may need an extra chest tube.[5,6] The current study assesses the impact of educational intervention on the knowledge of the resident surgeon and nurses.

Methodology

The present study was conducted at Hayatabad Medical Complex (HMC), Peshawar from January 2020 to September 2020. This study included all those resident surgeons and nurses working in Hayatabad medical complex, Peshawar, Pakistan, that were willing to participate in the current study.

The data was collected based on a self-developed questionnaire. The questionnaire was developed based on the previous reports.[7-9] The initial draft was validated

Table 1. Study instrument used for study purposes

Items	Responses
The fluid in the drainage bottle has to be kept 90 cm below the chest level in order to prevent the fluid from entering the pleural space.	False
	True
The chest tube inserted to the pleural space provides reinflation of the collapsed lung.	False
	True
Pneumothorax is the most important case for which the insertion of a chest tube is necessary	False
	True
Intrapleural pressure is the pressure in the pleural space.	False
	True
Regular oral analgesic use is effective in reducing the pain stemming from the chest tube	False
	True
Gurgitation seen in the drainage bottle may be an indicator of air leak.	False
	True
The movement of fluid by breathing in a chest tube is called oscillation.	False
	True
The level of suction should be generally arranged between 10-20 mmHg.	False
	True
Patients must perform the Valsalva maneuver during the removal of a chest tube	False
	True
A Heimlich valve can be inserted to the end of the catheter to increase the mobilization of the patient, reduce the duration of the stay in hospital	False
	True

through face validation by the thoracic surgeon. The initial face-validated draft was then further validated through a pilot study. The pilot study was conducted on 23 participants, and the Cronbach alpha value was 0.78, which indicates an excellent internal consistency. It is comprised of two parts. The first part dealt with demographics, while the second concerned the knowledge of the chest tube. To each correct answer, 1-point was assigned and a 0-point to each incorrect answer. The detail is given in table 1.

Data collection and education intervention

Initially, the data was collected from the participants through a validated scale before the education intervention. The education intervention regarding the chest tube was made by delivering lecturers. The data was then collected after the education intervention was given. The data was collected through google forms. The collected data was then transferred to Microsoft Excel for assessing missing data.

Statistical analysis

the statistical analysis was carried out using SPSS v25. The normality of the data was assessed using the normality test. The parametric test was applied as the data was normally distributed. Descriptive statistics were applied to explore the study variables. The p-value was considered significant at 0.05.

Results

In the current study, most participants fell in the age range of 18-30 years (63.6%) and were females (59.7%). Moreover, most participants were nurses with experience of 1-5 years (55.8%). The detail can be seen in Table 2.

The knowledge of the participants was significantly improved regarding the position of the drainage bottle ($p<0.0001$), chest tube insertion ($p=0.007$), and the importance of the chest tube in pneumothorax ($p=0.001$). Moreover, the knowledge of the participants was greatly enhanced by education intervention about the use of analgesics in relieving pain ($p>0.0001$) and the correct use of the Heimlich valve ($p>0.0001$), as shown in Table 3. Overall, the education intervention significantly influenced the study participants' knowledge, as shown in figure 1.

Discussion

The current study assesses the impact of educational intervention regarding chest tube among resident surgeons and nurses. The study showed that education intervention significantly improved the knowledge regarding chest tube. The overall knowledge of the study participants was satisfactory after the intervention.

A sufficient understanding of chest anatomy and physiology by nurses and resident surgeons is crucial for ensuring quick and efficient management in individuals with chest tubes who may develop complications. In the current study, the intervention significantly improved the knowledge of physiology and anatomy. These findings are comparable with a study conducted in Ireland . The nurses are directly responsible for patient management .

Table 2. demographic characteristics of the study participants

Baseline characteristics		Frequency	Percentage (%)
Age	18-30	49	63.6%
	>30	28	36.4%
Gender	Male	31	40.3%
	Female	46	59.7%
Occupation	Resident surgeon	33	42.9%
	Nurse	44	57.1%
Experience	>1 year	22	28.6%
	1-5 years	43	55.8%
	>5 years	12	15.6%
Services	General wards	14	18.2%
	emergency unit	21	27.3%
	intensive care unit	20	26.0%
	out-patient clinic	22	28.6%

Table 3. Impact of intervention on the individual item

Instrumental items		Educational intervention				
		Before		After		P-Value
		N	%	N	%	
K1	False	20	90.9%	2	9.1%	<0.0001
	True	23	41.8%	32	58.2%	
K2	False	17	81.0%	4	19.0%	0.007
	True	26	46.4%	30	53.6%	
K3	False	16	88.9%	2	11.1%	0.001
	True	27	45.8%	32	54.2%	
K4	False	14	73.7%	5	26.3%	0.071
	True	29	50.0%	29	50.0%	
K5	False	20	90.9%	2	9.1%	<0.0001
	True	23	41.8%	32	58.2%	
K6	False	12	75.0%	4	25.0%	0.083
	True	31	50.8%	30	49.2%	
K7	False	17	89.5%	2	10.5%	0.001
	True	26	44.8%	32	55.2%	
K8	False	14	77.8%	4	22.2%	0.032
	True	29	49.2%	30	50.8%	
K9	False	8	80.0%	2	20.0%	0.099
	True	35	52.2%	32	47.8%	
K10	False	22	91.7%	2	8.3%	<0.0001
	True	21	39.6%	32	60.4%	

Therefore, anticipated training programs must include thorough chest anatomy and physiology topics.

Pain control in patients is crucial during chest tube intubation and removal and the interval between these two procedures. One found that the insertion of a chest tube caused patients to experience high levels of pain and anxiety; as a result, they devised a protocol involving patient education, technical issues, local anesthetics, and pre-medication to reduce pain . It is probable that a more significant percentage of nurses who assist with the installation of a chest tube answer questions concerning pre-medication appropriately. The physician makes a choice on the need for pre-medication and pain management prior to the placement of a chest tube . However, the nurse is responsible for pain management during the interval between the chest tube placement and removal . After inserting a chest tube, nurses should often assess pain levels and the efficacy of pain medications .

This study is subjected to various limitations. First, the sample size was small, which may affect the study's external validity. Secondly, the improvement in knowledge may be confounded by their discussion, the internet, or other sources.

Conclusion

The study showed that education intervention significantly improved the knowledge regarding chest tube. The overall knowledge of the study participants was satisfactory after the intervention. Therefore, it is suggested that the focused education program be designed and implemented to effectively manage the patients and overcome the related complications.

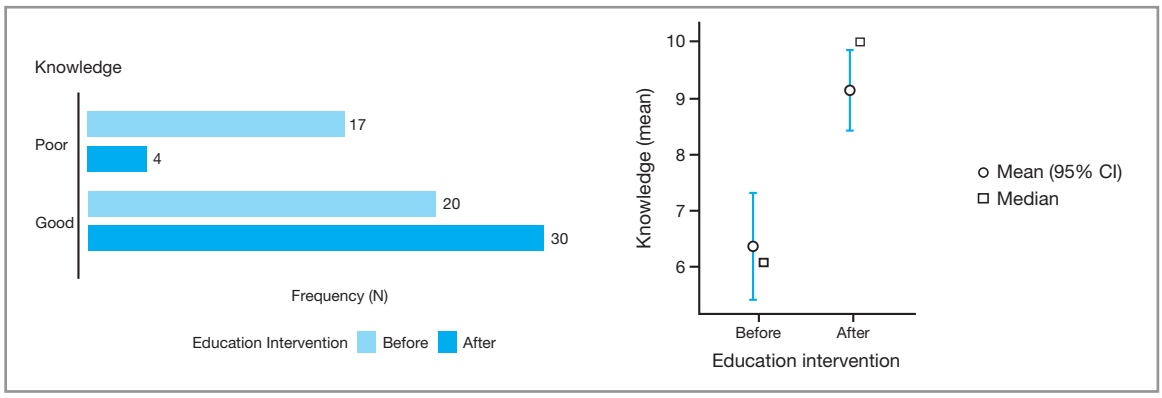

Figure 1: Impact of the intervention on overall knowledge

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