Evaluation of the nursing management for patients undergoing to water seal chest tube drainage system

تقييم العناية التمريضية للمرضى مع نظام تصريف السوائل تحت الماء عن طريق الانبوب الصدري المغلق

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الخلاصة :
الهدف : تهدف الدراسة تقويم العناية التمرضية المقدمة للمرضى الخاضعين لنظام تصريف السوائل تحت الماء.
المنهجية :دراسة وصفية أجريت في مستشفيات بغداد التعليمية والتي شملت مدينة الطب/ مستشفى الشهيد غازي الحريري و مستشفى اليرموك التعليمي و مستشفى الكندي التعليمي في ردهات الكسور وردهات الجراحة الصدرية للفترة بين 10 تشرين الاول 2012 ولغاية 30 أيلول 2013. ولتحقيق أهداف الدراسة تم اختيار عينة غرضيه (غير احتمالية) شملت (50) ممرض وممرضة الذين يقدمون الرعاية التمريضية للمرضى الراقدين في ردهات الكسور وردهات الجراحة الصدرية مع نظام تصريف السوائل تحت الماء عن طريق الأنبوب الصدري المغلق. جمعت البيانات من خلال استخدام الاستبانه كأداة لجمع المعلومات لتحقيق هدف الدراسة حيث تكونت من جزأين : الأول هو معلومات الديموغرافيه والثانى يتكون من 13 خطوه لملاحظه العناية التمريضية للمرضى مع نظام تصريف السوائل. تم تحديد مصداقية وثبات الأداة لاختبار ثبات الاستبانة من قبل لجنة من الخبراء وتم تحليل البيانات خلال تطبيق الإحصاء الوصفي (التكرارات،النسبة المئوية ،الوسط الحسابي المرجح والكفاية النسبية).
النتائج: أظهرت نتائج الدراسة إلى أن معظم الممرضين كانوا ذكور(22) خريج المعهد،(8) خريج مدرسة التمريض وبعمر يتراوح بين 20-30 و 31-40 سنة وهم يعملون في ردهات الكسور وردهات الجراحة الصدرية منذ 1-5 سنوات و بخبرات تمريضية ضعيفة. كذلك، أثبتت الدراسة إلى أن الممرضين الذكور خريجي مدارس التمريض هم غير كفؤين وغير مقبول إعطاءهم العناية التمريضية للمرضى مع نظام تصريف السوائل تحت الماء عن طريق الأنبوب الصدري المغلق. هؤلاء الممرضين كانوا يفتقرون إلى المعرفة والخبرة المتعلقة بمرونة إجراء تغيير أنبوب التصريف وقلة التعقيم حيث أنهم لا يعيرون أهمية لوجود الفقاعات وتسجيل مكونات السوائل المصروفة مما يدل على قلة العناية المقدمة والتقنية عند تقديم هذا الإجراء وهذا قد يؤدي إلى المضاعفات مثل ذات الرئة والاستروح الصدري والذي بدوره يؤدي إلى الفشل الرئوي.
الاستنتاجات: استنتجت الدراسة إلى أن معظم الممرضين الذين يعملون في ردهات الكسور وردهات الجراحة الصدرية يمتلكون معارف غير مقبولة المستوى حول العلاج التمريضي المقدم للمرضى الخاضعين لنظام تصريف السوائل تحت الماء عن طريق الأنبوب الصدري المغلق. وأشارت نتائج الدراسة ان هناك ضعف بمعارف الممرضين وخبراتهم المتعلقة بتغير أنبوب التصريف وقلة التعقيم.
التوصيات: أوصت الدراسة على التأكيد على أن الممرضين الذين يعملون في ردهات الكسور وردهات الجراحة الصدرية يجب أن يكونوا من خريجي المعاهد التمريضية (شهادة الدبلوم في التمريض) أو كليات التمريض ومن هم ذو تعليم ومعارف عالية المستوى لإعطاء عناية دقيقة وكاملة للمرضى الذين يعالجون عن طريق أنبوب التصريف. وكذلك أوصت الدراسة بضرورة تشجيع الممرضين والممرضات للمشاركة في برامج التعليم المستمر لتعزيز معارفهم حول كيفية التعامل مع نظام تصريف السوائل تحت الماء عن طريق الأنبوب الصدري المغلق.

Abstract:
Objective(s): The study objectives are to identify the nursing management provided to patients undergoing to water- seal chest tube drainage system..
Methodology: A descriptive study which was using the quantitative design. The study was conducted in Alhariri ,Alyarmouk, and Alkindy teaching hospitals starting from October 10th 2012 up to the September 30th 2013. To achieve the objectives of the study, A non-probability (purposive) samples of (50) nurses delete was consisted of all nurses who provides management for patients under-water –seal chest tube drainage systems. The questionnaire tool was constructed, consisting of two parts, first one the demographical data of the sample & the second is the 13th steps of observational checklist for nursing management of patients with under-water –seal chest tube drainage system, the questionnaire validity& reliability was determined by a panel of experts in and out of Nursing College, a suitable statistical analysis was applied for the data.
stem . 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. Instrument validity and reliability were determined through content validity, by a panel of experts and a suitable statistical analysis was applied for the data.
Results: The results of the study showed that most of the sample were males nurses at age group of (20-30) and (31-40)years old working at thoracic surgical wards since 1-5 years only with a poor nursing experience. Also, the result of study indicated that the male nurses who are with nursing institute(22) , preparatory nursing school

(20) and nursing school (8) were providing care to patients with chest tube under water- seal drainage not accepted. They were with knowledge deficit and experience in maintain patency and sterility when changing down tube, they do not note the presence of bubbling and recording the consistency of the drainage, which indicating poor management and technique provided and this may lead to complication such as pneumonia and pneumothorax, which may leads to pulmonary failure.

Conclusion: The study concluded 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.

Recommendations: The study emphasize that nurses working in thoracic wards must be at least with Diploma or Bachelorette degree of well educated to provide complete and accurate management for patients with chest tube. Also, the study recommends to apply an intensive courses for already these nurses to improve their knowledge and practice in caring for under – water –seal chest tube drainage system patients..

Keywords: Assessment, Nursing Management, Under- Water Seal Chest Tube Drainage System.

INTRODUCTION:

Chest tube is a drain inserted to remove air, fluid or blood from pleural cavity space to restore negative pressure to the pleural space, to re-expand a partially collapsed lungs and prevent reflux or drainage back into the chest. (1)

Because negative pressure in the pleural cavity exerts a suction force that keeps the lungs expanded, any chest trauma that upsets this pressure may cause lung collapse; consequently one or more chest tubes may be surgically inserted and then connected to a thoracic drainage system, thoracic drainage uses gravity to remove material that collects in pleural cavity, under water seal in the drainage system allows air and fluid to escape from this cavity. (2)

Approximately 150,000 deaths occur from trauma each year. Approximately 3 times this number of individuals are permanently disabled because of trauma, and the majority of this combined group are victims of polytrauma. Chest injuries occur in approximately 60% of polytrauma cases; therefore, a rough estimate of the occurrence of hemothorax related to trauma in the United States approaches 300,000 cases per year.(3)

Open chest tube clearing involves breaking the sterile environment separating the chest tube from the drainage canister tubing. The internal lumen may then be flushed with saline, or a second catheter may be inserted inside the chest tube and suction used to clear the obstructions. Closed chest tube clearing is performed using specially designed drainage systems. These systems use a magnetically driven wire loop to clear obstructions that form inside the chest tube.(4).

Major insertion complications include hemorrhage, infection, and re-expansion pulmonary edema.

Injury to the liver, spleen or diaphragm is possible if the tube is placed inferior to the pleural cavity. Injuries to the thoracic aorta and heart can also occur.

Minor complications include a subcutaneous hematoma or seroma, anxiety, shortness of breath (dyspnea), and cough (after removing large volume of fluid). In most cases, the chest tube related pain goes away after the chest tube is removed, however, chronic pain related to chest tube induced scarring of the intercostal space is not uncommon.(5)

Subcutaneous emphysema indicates backpressure created by a clogged drain or insufficient negative pressure.(6)

Aims of the study: The study aims to evaluated of the nursing for patients undergoing to water seal chest tube drainage systems, and to finding out the relationship between nursing for patients undergoing water seal chest tube and the demographic characteristics that includes (age, gender, level of education, years of experience)

METHODOLOGY:

Design of the study: Quantitative design (a descriptive study) was carried out to achieve the purpose of the study.

Setting of the study: The study was conducted in surgical wards at Teaching Hospitals in at Alhariri, Alyarmouk, and Alkindy Teaching Hospitals. These hospitals provide various nursing managements for patients especially, managing patients undergoing to- water seal drainage system.

Sample of the study: A non-probability (purposive) samples of (50) nurses' who selected randomly and was consisted of all nurses provided nursing management for patients who have undergoing to-water seal drainage system .

Instrument construction: A constructed questionnaire was design and means of an observational technique for the nurses was constructed to measure the variables underlying study.

A questionnaire based on comprehensive review of relevant literature and previous studies and related books were used. These instruments consist of two parts namely; the demographic data of the nurse, and a specific questions to assess the steps of nursing management toward patients with chest tube. The questionnaire was constructed for the purpose of the study consisted of (13) questions.

Part I: Demographic Data Sheet:

This part concerned with personal information include, the nurses (gender, age, educational level, numbers of experience years and participating in the training courses).

Part II: Observational checklist for Nurses:

This part contained (**13**) Items concerning the management for patients who undergoing to- water seal drainage system care.

Data collection:

The data collected by the researcher through the observe nurses how to applying the steps of managements.

Statistical data analysis:

Appropriate statistical approach was used that includes descriptive statistics (frequency, percentage, mean of score, Relative sufficiency) and inferential statistics significance, and correlation coefficient.

RESULTS:

Table 1. Distribution of the nurses by their socio-demographic

List	Variables	Frequency	Percentage
1	**Age(years)**		
	20-30	18	36.0
	31-40	18	36.0
	41-50	7	14.0
	51 & over	7	14.0
	Total	50	100
2	**Gender**		
	Male	30	60.0
	Female	20	40.0
	Total	50	100
3	**Level of Education**		
	Nursing school	8	16.0
	Preparatory Nursing School	20	40.0
	Nursing institute	22	44.0
	Nursing college	0	0
	Total	50	100
4	**Years of Working in nursing (experience)**		
	< 1year	6	12.0
	1-5	26	52.0
	6-10	18	36.0
	Total	50	100

Table 1 describe that (36 %) of the study sample at age of 20-30 and 31-40 years old, they was males 60%, graduated from nursing institute 44%, of them have year of experiences from (1-5) years only in this field with no training course to increase their knowledge or skills in caring

Table 2. Mean, Standard Deviation & Weighted Mean of Nursing Management

list	Variables	Mean(SD)	Level
1	Give full explanation & reassurance to the patient to anxiety & gain cooperation	2.88(0.23)	24 (HL)
2	Keep the patient sitting up well- supported by pillows whilst in bed	2.48(0.58)	20.7(HL)
3	Ensure that two pairs of chest clamps accompany the patient to avoid accidental disconnection	2.58(0.49)	21.5(HL)
4	Keep the clamps don't on for more than essential period to prevent tension pneumothorax	2.42(0.49)	20.2(HL)
5	Ensure that the drainage system always kept below level of the chest to prevent back flow into the pleural space	2.58(0.60)	21.5(HL)
6	Check regularity	2.26(0.75)	18.8 (HL)
7	Maintain patency by lifting section of tubing at regular intervals to facilitate gravitational drainage of blood & others	1.92(0.66)	16 (ML)
8	Note the presence of bubbling	1.82(0.69)	15.2 (ML)
9	Maintain sterility when changing the down- tube and drainage device	1.46(0.50)	12.2 (ML)
10	Measure and record the amount & consistency of drainage	1.70(0.78)	14.2 (ML)
11	Supporting the chest drain on the chest wall with adhesive tape	2.32(0.84)	19.3(HL)
12	Securing the tubing on the bed clothes or patients clothes with pin	2.02(0.68)	16.8 (HL)
13	Stabilizing the drainage device by housing it in a special cradle on the side of the bed	2.58(0.60)	21.5 (HL)

- **≥ 0.09 (low level) ** 1-1.9 (Moderate level) *** 2- 3 (high level)**

Table (2) shows that the items which have moderate mean was Maintain sterility when changing the down- tube and drainage device, and Measure and record the amount & consistency of drainage which as 1.46 and 1.7 respectively

Table 3. Association between Nursing management and nurses age, level of education ,years of experiences

Model	Unstandardized coefficients		Standardized coefficients	t-test	Sig P≥0.05
	B	Std. Error	Beta		
age	.016	.684	.005	.024	0.981
Level of education	1.219	.775	.236	1.673	.122
Years of experience in the field	.020	1.065	.004	.019	0.985

Table (3) show that there no statistical differences between the application of nursing management and their age, level of education, and year of experiences at P≥0.05

Table (4); level of management patients with chest tubes, by male & female nurses

gender		Management level		Total
		Average	Good	
Male	count	21	9	30
	% of total	42.0%	18.0%	62.0%
Female	Count	11	9	20
	% of total	22.0%	18.%	40.0%
Total	Count	32	18	50
	% of total	64.0 %	36.0%	100%

Table (4) Demonstrate same level of management presented to patients with chest tubes, by male & female nurses.

Table 5: Statistical differences between nursing management and level of education

Level of education		Management level		Total	Significant association P ≥0.05
		Average	Good		
Nursing School	Count	6	2	8	
	% of total	12.0%	4.0%	16.0%	
Preparatory nursing School	Count	15	5	20	0.011
	% of total	30.0%	10.0%	40.0%	
Nursing institute	Count	11	11	22	
	%of total	22.0 %	22.0%	44.0%	
Total	Count	32	18	50	
	% of total	64.0%	36.0%	100.0%	

Table (5) showed significant association between level of education & management given to patients, it revealed good level of management 22% was presented by the nurses graduated from nursing institute.

Table 6: Statistical differences between nursing management and Years of experience

Years of experience in nursing		Management level		TOTAL	Approx. Sig.
		Average	Good		
<1year	count	4	2	6	
	% of total	8.0%	4.0%	12.0%	
1-5	count	16	10	26	0.888
	% of total	32.0%	20.0%	52.0%	
6-10	Count	12	6	18	
	% of total	24.0%	12.0%	36.0%	
Total	Count	32	18	50	
	% of total	64.0 %	36.0%	100%	

Table(7) No Significant association between years of experience in caring of patients with chest tube & level of management presented by the nurses as showed in this table which explain the nurses demand for continuous education to improve there knowledge & practice

DISCUSSION:

The majority of present study 36% were at age group (20- 30) and (31-40) years , they were male nurses 60% , with level of education 44% graduated from nursing institute working in thoracic surgical wards for (1-5) years 52%.. This result shows that the nursing staff caring to patients with chest tubes which is a serious field have a very little experience and poor knowledge, that may be causing serious complication**.** It is important that nurses receive appropriate training in the management of chest drains and ensure that patients are cared for safely and competently. (**7**)

Although there is many factors affecting nursing intervention, The important nursing care to improve gas exchange & breathing for post- thoracic operation is the proper management of chest tube, this fact is not appeared in table (2), which presents that only (1.46) mean of score of nursing intervention related to maintaining sterility in changing and caring down tube and drainage device, also (1.70) mean of score to observing, measuring and recording the amount , consistency of drainage, while (2,88) mean of score related to explaining and reassuring the patient and his family. This result revealed the complication occurred such as incision or pulmonary infection and pneumothorax which may leads to pulmonary failure due to malpractice in caring of chest tube and under water- seal drainage, as it presented by (**5**). When a chest tube is inserted for whatever reason, maintaining patency is critical to avoid complications.

Manual manipulation, often called milking, stripping, fan folding, or tapping, of chest tubes is commonly performed to clear chest tube obstructions. No conclusive evidence has demonstrated that any of these techniques are more effective than the others, and no method has shown to improve chest tube drainage. Furthermore, chest tube manipulation has proved to increase negative pressure, which may be detrimental, and painful to the patient. For these reasons, many hospitals do not allow these types of manual tube manipulations. Also Drainage of the pleural space by means of a chest tube is the commonest intervention in thoracic trauma, and provides definitive treatment in the majority of cases. While a relatively simple procedure, it carries a significant complication rate, reported as between 2% and 10%. While many of these complications are relatively minor, some require operative intervention and deaths still occur.

In addition, the study demonstrated that, age, level of education and the years of experience in thoracic surgeries wards have no significant association with management presented to patients with chest tube drainage system, as showed in table (3), which indicated the need for intensive nursing courses to increase there, practice and knowledge in managing the patients and prevent pulmonary complications may occurred. Suction may be attached to the underwater seal drain to manage a non-resolving pneumothorax following thoracic surgery or to facilitate drainage of a pleural effusion. Ideally, a high volume /low-pressure system should be used.**(**4)

No significant association between level of management provided to chest tubes drainage system patients post thoracic surgeries and sample age groups as showed in table (4), it demonstrate a good level of management provided by both age group 21-30 and 31- 40 year, which means the nurses age is not affecting nursing experience and management presented to these patients.

The patient and the chest drain site should be assessed at least daily for signs of systemic or local infection. Clamping a chest drain tube can increase the risk of a tension pneumothorax. This occurs when air from the alveoli enters, but cannot leave, the pleural space. The air can build up, causing a mediastinal shift towards the unaffected lung, leading to compression of the vena cava, which is associated with shock and collapse. The condition can be fatal. If bubbling is observed in the underwater seal drain, the chest tube should never be clamped. A non-bubbling chest drain should not usually be clamped except momentarily in the event of its being disconnected, if there is damage to the drainage bottle, or to locate a leak in the drainage system, If controlled drainage of a large pleural effusion is required, the drain may be clamped in the initial stages to prevent the risk of re-expansion pulmonary oedema. **(**7**)**

Demonstrate same level of management presented to patients with chest tubes, by male & female nurses, that interprets gender is not affecting care presented. The level of education of the nurses affecting caring provided to patients, this result presented by table No 6, which showed significant association between level of education & management given to patients, it revealed good level of management 22% was presented by the nurses graduated from nursing institute, table (4)

No Significant association between years of experience in caring of patients with chest tube and the level of management presented by the nurses as showed in table (6), which explain the nurses demand for continuous education to improve their practice.

The result of study showed that the male nurses who are with preparatory nursing school were providing care to patients with chest tube under water- seal drainage not accepted, they were lacking knowledge and experience in maintain patency and sterility when changing down tube, note presence of bubbling and recording the consistency of the drainage, which indicating poor management and technique provided & this may lead to complication such as Pneumothorax and pulmonary failure. Also result presented significant relation between level of education and management provided to these patient, which revealed nurses need to improve their knowledge besides their skills.

CONCLUSION:

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

RECOMMENDATIONS:

1- Nurses who are providing care to patient chest- tube must be at least with deploma level of education to give care and avoid complication such as pneumonia & pneumothorax.
2- Provide intensive courses in providing an complete care to nurse working in surgical thoracic wards.

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