

Nurses' Knowledge and Practice about Measures to Prevent Pulmonary Embolism among Patients in Aga General Hospital

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Abstract: Background: Pulmonary embolism is a major health problem and its prevention is an important goal of nursing care. The nurses have a clear role in assessment, prevention, identification and management of pulmonary embolism. So this study aimed to assess nurses' knowledge and practice about measures to prevent pulmonary embolism among patients in Aga general hospital. **Method:** A descriptive research design was used. **Study subjects:** All available nurses (50) who provide direct care for patients in medical, surgical, orthopedic and ICU departments were included. Data was collected by using two tools: **tool I;** Structured questionnaire sheet which comprised of two parts; questions related to socio-demographic characteristics & questions related to nurses' knowledge regarding pulmonary embolism, it's care and prevention; **tool II;** A performance checklist which consisted of three parts; active and passive range of motion exercises, deep breathing exercises and early ambulation. **Results:** The majority of the studied nurses had a moderate score of general knowledge, drug knowledge and overall knowledge about pulmonary embolism. However, about half of the studied nurses (40%) had a low score of knowledge related to nursing care of patients with pulmonary embolism and the majority of the studied nurses had a low score in relation to all practice domains. **Conclusion;** All the studied nurses had a poor score in relation to all practice domains. **Recommendations;** A regular, continuous educational program should be designed about measures to prevent pulmonary embolism.

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Key words: pulmonary embolism, nurses, measures, knowledge, practice.

1. Introduction

Pulmonary embolism is a common disorder that is potentially fatal. It does not receive as much attention as some other conditions, but the seriousness of this disorder should not be undermined (*Raja et al., 2015*). It is known for having non specific signs and symptoms which make it harder to distinguish from cardiovascular and respiratory syndromes (*Liu et al., 2015*).

Pulmonary embolism is the obstruction of a pulmonary vessel or vessels by a thrombus. Pulmonary emboli are caused by the blockage of the pulmonary arterial system, disrupting the ability of the lung to properly oxygenate blood from the venous circulatory system. While there are several causes of these blockages, including air, fat, and amniotic fluid, the most common cause results from a venous clot that typically travels from a deep vein thrombosis (DVT) in the lower extremity. (*Goggs et al., 2009*).

Prolonged immobility, advanced age, postoperative period, post-infarction period, heart failure, obesity, pregnancy, and other factors, predispose for thromboembolic disease via venous stasis. Events such as local trauma, vasculitis and previous thrombosis cause damage to the endothelium

of the venous wall. Polycythemia, contraceptive pills, as well as malignant cancers, and especially adenocarcinomas, are associated with coagulability disorders and an increased risk of DVT and PE (*Tian et al., 2016; Kostadima, & Zakynthinos, 2007*).

Nurses can play a major role in pulmonary embolism prevention if well educated and empowered to change hospital culture. Their increased level of knowledge undoubtedly leads to an improvement in the delivery of patient care (*Lee et al., 2014*).

Significance of the study

Pulmonary embolism and deep venous thrombosis (DVT) are 2 manifestations of venous thromboembolism (VTE), and PE is commonly a consequence of DVT. Pulmonary embolism constitutes the majority of the venous thromboembolism (VTE) syndromes encountered in medicine today (*Yeo et al., 2015*). Pulmonary embolism (PE) has an incidence of approximately 0.1% among the general population and accounts for 2% to 15% of unexpected sudden death, 2% of all cardiac arrest (CA), and 6.5% of non cardiac CA. Fulminant PE can cause CA in 41% of cases, with a mortality ranging from 65% to 95% (*Heit, 2015*).

Pulmonary embolism has a mortality rate of 2% to 8%, but when left untreated, the mortality rate is as high as 25% to 30%. The disease continues to be under diagnosed despite its high mortality rate; autopsy based studies have shown that the diagnosis of pulmonary embolism (PE) is made less than 50 % of the time before death (*Galanaud et al., 2014*).

Pulmonary embolism is a common and potentially lethal condition. Despite diagnostic advances, delays in pulmonary embolism diagnosis are common and represent an important issue. Therefore, Prophylaxis significantly reduces pulmonary embolism morbidity and mortality, and thus represents a real long-term health-care benefit. So, it is very important to assess the nurses' knowledge and practice about measures to prevent pulmonary embolism among hospitalized patients.

Aim of the Study

This study aims to assess nurses' knowledge and practice about measures to prevent pulmonary embolism among hospitalized patients.

Research questions

To fulfill the aim of the study the following research questions will be formulated:-

Q.1: Do nurses working in Aga general hospital possess the necessary knowledge about measures to prevent pulmonary embolism among hospitalized patients?

Q.2: Do nurses working in Aga general hospital possess an adequate practice of measures to prevent pulmonary embolism among hospitalized patients?

Q.3: Is there a relationship between nurses' Sociodemographic characteristics and their knowledge and practice about measures to prevent pulmonary embolism among hospitalized patients?

2. Materials and Methods

Design of the study: A descriptive and exploratory design was used to assess the nurses' knowledge and practice about measures to prevent pulmonary embolism among hospitalized patients.

Setting: This study was conducted during a period of three months from the beginning of March 2016 till the end of May 2016 in internal medicine, surgery, orthopedic surgery, and intensive care units (ICUs) departments in Aga general hospital in Daqahliyah.

Subjects: The sample of this study consisted of 50 nurses who provide direct patients care in the above-mentioned departments, accept to participate voluntarily in the study and employed for at least one year.

Tools for data collection: *Data was collected using two tools:*

1- *Nurses' knowledge about measures to prevent pulmonary embolism among patients questionnaire sheet.*

2- *Nurses' practice to prevent pulmonary embolism among patients performance checklist.*

Tool I: Nurses' knowledge about measures to prevent pulmonary embolism among hospitalized patients questionnaire sheet: This tool was developed by the investigator after reviewing the recent and relevant literature, it consists of 59 questions and divided into two parts.

Part one: It includes 5 questions related to socio-demographic data of the studied nurses such as work area, age, professional qualifications, years of experience, and attending any training programs or courses about pulmonary embolism. **Part two:** It includes 54 questions related to nurses' knowledge regarding pulmonary embolism such as a definition, site, risk factors, signs and symptoms, common investigations, preventive measures, complications, therapeutic treatment, nursing management and pulmonary embolism preventive exercises for high-risk patients.

Scoring system: The total score of nurses' knowledge against each item was calculated in which each respondent was given one point for each correct answer and zero for an incorrect answer or missed answers.

Tool II: Nurses' practice to prevent pulmonary embolism among hospitalized patients checklist which developed by (*Eldosoky, 2004*), it consists of 101 questions and divided into three parts:

Part one: Includes an active and passive range of motion exercises. (72 steps)

Part two: Includes deep breathing exercises. (15 steps)

Part three: Includes patient's early ambulation. (14 steps)

Scoring system: The total score of the nurses' practice was calculated to be 101 steps. The possible choice for each item was; done or not done. In which each nurse was given one point for each step done correctly, in the proper and suitable time, and zero for not done or incorrect.

Validity of the study:

Tool I was tested for content – related validity by 7 experts, from Mansoura University, two professors of internal medicine; faculty of medicine, three professors of medical surgical nursing, the head of ICU department, as well as the head of internal medicine department in Aga general hospital, who reviewed the tool for being comprehensive, relevant, specific and having the right sequence. According to their opinions, minor modifications were done.

Pilot study:

A pilot study was carried out on 10 nurses from all the mentioned departments in Aga general hospital to assess the clarity and the applicability of the tool as well as to estimate the time needed to answer it. The necessary modifications were done prior to data collection. Those nurses were excluded from the main study.

Limitations of the study:

1. The convenience sample used in the study, may not have been representative of all nurses working at the same departments in other hospitals and may diminish the applicability of the findings in general.

2. The relatively small sample size of 50 respondents may have affected the ability to actualize statistical significance.

3. Results

Table 1 shows the socio-demographic characteristics of studied nurses about (36%) of the study subjects worked in ICU department; (24%) were in medical department (54%) were at the age between 20 and 30 years old. In relation to the educational level more than half of the study subjects (60%) were nurses graduated from nursing secondary schools, (30%) had a bachelor degree and (10%) of them have degree from technical institute of nursing.

Regarding years of experience of nurses about one third of them (34%) have experience between 5 to 10 years, and (28%) of them between 1 to 5 years. Finally, regarding to attending training programs, courses, workshops, and conferences about pulmonary embolism the majority of nurses (96%) hasn't attending any training programs.

Figure 1 shows the frequency distribution of nurses in relation to their knowledge domains regarding pulmonary embolism. The majority of the studied nurses had a moderate score of general knowledge about prevention of pulmonary embolism (94%) and only (6%) of them had a low score. Regarding the drug knowledge (64%) of the studied nurses had a moderate score, (22%) had a low score and (14%) had a high score. In relation to nursing care knowledge (40%) of the studied nurses had a low score, (36%) of them had a high score and (24%) had a moderate score. Finally, Regarding the overall knowledge about prevention of pulmonary embolism the majority (86%) of the studied nurses had a moderate score of the overall knowledge and only (14%) of them had a low score.

Figure 2 shows the frequency distribution of nurses in relation to their practice domains regarding prevention of pulmonary embolism. Almost all the studied nurses had a poor score of total practice (98%). Only (2%) of the studied nurses showed a fair score of total practice. The majority of the studied

nurses had a poor score in relation to early ambulation, deep breath exercise and active and passive range of motion exercise only (6%) of them had a fair score in early ambulation, (8%) had a fair score in deep breathing exercises and finally (2%) of them had a fair score in active and passive range of motion exercise.

Table 2 shows the relationship between nurses' total score of knowledge domains and practice domains there were a significant correlation between total score of knowledge domains and practice domains were ($p < 0.05$). Regarding early ambulation there were an intermediate positive correlation between it and drug knowledge (0.395), nurse care knowledge (0.428) and overall knowledge (0.329). In relation to deep breathing exercises there were also an intermediate positive correlation between them and drug knowledge (0.413), nurse care knowledge (0.385) and overall knowledge (0.403).

On the other hand there were an intermediate positive correlation between range of motion exercise and both of drug knowledge (0.414) and nurse care knowledge (0.422) and an intermediate negative correlation with general knowledge (-0.374). Finally, there were an intermediate positive correlation between total practice and both of drug knowledge (0.491) and nurse care knowledge (0.498) and an intermediate negative correlation between it and general knowledge (-0.282).

Table (1):- Socio-demographic characteristics of studied nurses (N=50)

Demographic data	No	%
Department		
▪ Surgery	11	22.0%
▪ Medical	12	24.0%
▪ Orthopedics	9	18.0%
▪ ICU	18	36.0%
Age		
▪ <20	9	18.0%
▪ 20-	27	54.0%
▪ 30-	4	8.0%
▪ 40-50	5	10.0%
▪ 50+	5	10.0%
Qualification		
▪ Nursing Bachelor	15	30.0%
▪ Nursing Diploma	30	60.0%
▪ Others	5	10.0%
Experience years		
▪ < 1 year	5	10.0%
▪ 1-	14	28.0%
▪ 5-	17	34.0%
▪ 10-	11	22.0%
▪ 20+	3	6.0%
Training		
▪ Yes	2	4.0%
▪ No	48	96.0%

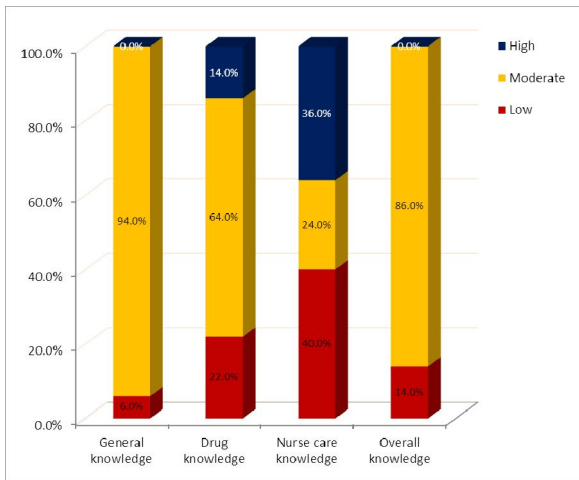


Figure (1) Frequency distribution of nurses in relation to their knowledge domains

Low: Score $5 < 50\%$
 Moderate: Score $50\% < 75\%$
 High: Score $\geq 75\%$

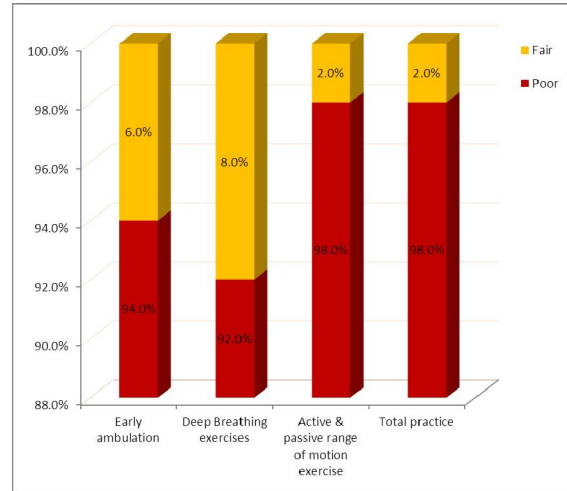


Figure (2) Frequency distribution of nurses in relation to their practice domains

Poor: Score $5 < 50\%$
 Fair: Score $50\% < 75\%$
 Good: Score $\geq 75\%$

Table 2:- Relationship between nurses' total score of knowledge domains and practice domains.

Item	Correlation coefficient	General knowledge	Drug knowledge	Nurse care knowledge	Overall knowledge
Early ambulation	R	-.050	.395**	.428**	.329*
	P	.728	.005	.002	.020
Deep Breathing exercises	R	.106	.413**	.385**	.403**
	P	.466	.003	.006	.004
Active & passive range of motion exercise	R	-.374**	.414**	.422**	.155
	P	.007	.003	.002	.283
Total practice	R	-.282*	.491**	.498**	.272
	P	.048	.001	.001	.056

r: Pearson correlation coefficient * P < 0.05 (significant)

Interpretation of r:

Strong (0.75-0.99) Intermediate (0.25-0.74)
 Weak (0.1-0.24)

4. Discussion

Pulmonary embolism is a common cause of morbidity and mortality. It can develop in all sorts of patients such as traumatic, surgical and cardiac patients and in healthy people as well for no obvious (Parvizi et al., 2014). Pulmonary embolism poses a threat to hospitalized patient's recovery as it is an unexpected killer and can cause serious complications. It is preventable and the cost of treating this problem is considerably more than that of preventive practice. Accurate pulmonary embolism risk assessment facilitates the application of most appropriate venous thromboprophylaxis (Haymes, 2016).

Prophylactic measures, such as pharmacological and non pharmacological strategies, can be taken in an attempt to prevent or to reduce the incidence of

pulmonary embolism. Nurses have a clear role in prophylaxis and risk assessment which are important aspect of pulmonary embolism management. Nursing assessment provides the physician with a baseline for the patient's progress or deterioration, helping in the early detection and prevention of complication of pulmonary embolism (Stein & Matta, 2013).

Hence, the nurse must be aware of these patients whose medical condition puts them at risk and must implement plans to decrease this risk (Leffers, 2014). So the aim of this study was to assess nurse's knowledge and practice about measures to prevent pulmonary embolism.

The present study findings revealed that, more than half of the studied nurses were graduated from nursing schools with diploma degree and at age group

between 20 to 30 years old and had an experience between 5 to 10 years. This results may be due to that the majority of nurses graduated from nursing schools degree prefer not to continue for higher education and work with their diploma degree and those graduated with bachelor degree work only in specialized departments such as intensive care units, neonates care units and operating theaters.

This finding is in agreement with the study carried out by *El-Sayed et al. (2015)* who revealed that the majority of nurses were diploma nurses. In this regards the nursing syndicate revealed that 240,000 nurses in Egypt are registered at the nursing syndicate, of these 95% are diploma and technical institute nurses (about 228,000) and 5% (about 12,000) are bachelor degree nurses (*Egyptian et al., 2012*).

This results goes in line with *Shaaban (2015)* who stated that the majority of the nursing manpower in Egypt are graduated from nursing schools and those graduates nowadays employed in all nursing services. However, they added that the trend nowadays is that graduates from faculty of nursing are employed in areas that geared to the care of patients needing high care.

The results of this study comes in consistent with *Yaakup et al. (2014)* who said that the requirement entry scores for nursing high school have been increasing also and currently exceeds the required scores for general high school which clearly indicates growing demand for nursing high school education since the supply of high school nursing education has been growing and therefore we observe a much less evident shortage of high school nurses.

Moreover, the findings of the present study indicated that the majority of the studied nurses did not attend any training courses, workshops or programs about pulmonary embolism and it is prevention and these points to an area of deficient continuing nursing education. On the other hand *National nursing: core competency standards (2014)* stressed that training programs were required to target the specific needs of nursing staff working at different care settings. In this respect *Ashktorab et al. (2015)* stressed that the in-service education is important and is considered as a corner stone of total quality management. Moreover, the continuous improvement is impossible without it. On the same line, *Halcomb (2010)* added that quality begins with education and ends with education and emphasized that educational programs should provide nurses with the necessary attitude and behavior skills basic to efficient practice of the work.

The results of the present study revealed that in relation to overall knowledge and general knowledge domains the majority of the studied nurses had a

moderate level of general knowledge about pulmonary embolism and it's prevention. This results may be due to most of the studied nurses ages are between 20 to 30 years old and most of them gain access to internet and can browse the web sites for extra information and update their information about diseases they may see during their daily work to see how to deal with it and care for patients having these diseases.

This result was in agreement with *McHugh and Lake (2010)* who stated that whatever is learnt in nursing school tend to be forgotten if not applied or stressed on.

Moreover, this findings was supported by *et al. (2014)* who reported that the heightened awareness of the client risk in any medical conditions allows appropriate prophylactic measures to be taken. In this respect, *Stein and Matta (2013)* also reported that one of the basic responsibilities of nurse is the patient and the public health education and risk factors may be the initial health information needed by the public because it is a preventive activity.

In relation to drug knowledge domain the results of the present study showed that near the third of the studied nurses had a low score of knowledge regarding prophylactic and therapeutic drugs used in prevention and treatment of pulmonary embolism. This may be attributed by the nurses working in surgical, orthopedic and internal medicine departments, said that anticoagulants (heparin and wafarin) and thrombolytic drugs are used very rarely in these departments.

On the other hand they also said that this drugs are usually used in intensive care units; for this reason nurses working in these departments had a low score of knowledge regarding drugs used in pulmonary embolism. This findings was in disagreement with *Leffers (2014)* who mentioned that it is of a great importance that nurses understand the medications and their effect on patient life and *Kendall-Gallagher et al. (2011)* who stressed on the necessity for nurses to understand administration of medications for all patients.

Finally regarding nursing care knowledge domain the results of the present study revealed that about half of the studied nurses had a low score regarding nursing care knowledge of patient with pulmonary embolism, patient-family health education and measures to prevent pulmonary embolism. This results was not in the same line with *Malinoski et al. (2010)* who stressed that the nurses have a key role in assessment, prevention, identifying and management of pulmonary embolism and homecare preparations.

The results of the present study revealed that almost all of studied nurses had statistically poor practice level in relation to all the practice domains which are; range of motion exercises, deep breathing

exercise and early ambulation. This might be due to the fact that nurses did not know the importance of this procedures for hospitalized patients. Furthermore, they viewed that it is not important to know the ROM exercises and deep breathing exercise which they consider it the responsibility of the physiotherapist and treating physicians. In addition to staff shortage, as each nurse is responsible for more than 5 patients. So, they did not have enough time to perform this preventive measures.

The study results were in the same line with *Al-Hawaly, et al. (2016)* who illustrated that the majority of studied nurses reported that the most common factors that affect their practice were worry to be infected, increased workload, there was no reward for good work, physical fatigue, shift time enough or not, there were no upgrades for efficient nurses, shortage of nursing staff, decrease their salary, and also there are no opportunities for attending training course.

This was in agreement with *Efstathiou et al. (2011)* who found that three similar factors that are perceived as obstacles to follow any standard precautions or guidelines. These factors were: Too busy, lack of nursing personnel and implementation of guidelines is time-consuming. This findings are in agreement with *Elfeky and Ali (2013)* who found that some nursing activities were excluded from the nurses plan of care because they were not mentioned by doctor such as performing joint exercises to prevent contracture and deformity, observing patient's extremities for thrombus formation, observing patient for signs of bleeding if the patient is receiving anticoagulant therapy.

This study results showed that there was a significant correlation between total score of knowledge domains and practice domains, there was an intermediate positive correlation between total practice and drug knowledge and nurse care knowledge and an intermediate negative correlation between it and general knowledge. This results was in the same line with *Abd kader and Ali (2012)* who stated that nursing is a combination of a body of knowledge and the application of that knowledge through nursing practice.

In this respect *Shahin et al. (2012)* has claimed that nursing knowledge has been developed and established as a systemic and generalized knowledge base for practice. This is based on the recognition that nursing knowledge production must also be viewed in conjunction with practice itself, as practice invades not only the use of knowledge but also gaining of knowledge.

Moreover, *Aziz (2014)* asserted that nursing competencies depended largely on intuitive knowledge and skills, resolve and action. Furthermore, *Thomas and Konieczny (2017)* reported that the reason for

nurses' improper performance are lack of nurses' knowledge and skills, improper environment, lack of in-service training of the nursing staff, lack of supervision from

In conclusion, the results of the present study revealed a general unsatisfactory level of nurses' overall practice about pulmonary embolism and a moderate level of nurses' overall knowledge pulmonary embolism, preventive measures and nursing care for patient with pulmonary embolism.

Conclusion

Based on the findings of the present study the following can be concluded that:

a-The majority of the studied nurses were at age group between 20 years and 30 years old, had experience between 5 to 10 years, had a diploma degree in nursing and hadn't attend any training programs, courses, workshops and conferences about pulmonary embolism.

b-The majority of the studied nurses had a moderate score of general knowledge, drug knowledge and overall knowledge about pulmonary embolism. However, about half of the studied nurses had a low score of nursing care knowledge about pulmonary embolism. **c-**The of the studied nurses had a poor score in relation to early ambulation, deep breathing exercises and active and passive range of motion exercise. **c-**There were no significant relationship between the nurses' score of overall knowledge and practice and socio-demographic characteristics such as age, qualifications, experience, work department and attending training programs about pulmonary embolism. **d-**Finally, there were a significant correlation between total score of knowledge domains and practice domains in relation to pulmonary embolism.

Recommendations

Based on the results of this study, and in order to reach standard level of nursing care, the following recommendations are suggested:

Improve nurses' knowledge about pulmonary embolism: definition, risk factors, signs and symptoms, common investigations, complications, preventive measures, drugs used in pulmonary embolism and nursing action for patients with pulmonary embolism through:

A-Encourage nurses working with patients at risk of developing pulmonary embolism to attend regular formal in-service educational programs about pulmonary embolism.

B-Improve nurses' performance through training programs about ROM exercises, deep breathing exercise, and early ambulation.

C-Nurses working with patients at risk of pulmonary embolism must have a specific job description to know exactly their responsibility in the clinical area and appropriate pulmonary embolism preventive measures should be integrated into nursing practice for high-risk patients.

D-Developing system of periodical nurses evaluation to determine strategies for upgrading their knowledge and enhancing their practice.

E-Nurses should be familiar with and trained to use high-risk assessment tools (Well's score and revised Geneva system) as a predictive index of pulmonary embolism and emphasis on Well's score which should be included in nursing sheets.

F- Procedure book about preventive measures in the Arabic language should be available for each nurse to standardize the nursing care given to a high-risk patient with pulmonary embolism.

G-Nursing curriculums must include the preventive measures of pulmonary embolism and assessment for high-risk patients with great emphasis on its application through adequate training and supervision of students in the different clinical settings.

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