

Effect of Educational Guidelines on Nurses' Performance Regarding Patients' Safety Undergoing Bronchoscopy

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Abstract

Background: A bronchoscopy is an essential tool for clinicians and health care providers treating patients with lung diseases. **Aim of the study:** evaluate the effect of educational guidelines on nurses' performance regarding patients' safety undergoing bronchoscopy. **Design:** A quasi-experimental research design was utilized to achieve the aim of this study. **Setting:** This study was conducted in chest department at Benha University Hospital, Qalyubiyah Governorate, Egypt. **Sample Convenience sample** of all available nurses (33). **Tools:** two tools were used to collect data for this study. **Tool I:** Nurses' structured questionnaire to assess nurses' knowledge related bronchoscopy and patients' safety undergoing bronchoscopy. **Tool II :**Observational checklist regarding patients' safety undergoing bronchoscopy to assess nurses' practice related bronchoscopy and patients' safety undergoing bronchoscopy **Result:** 43.3% of studied nurses had a satisfactory level of total knowledge and practice about patients' safety undergoing bronchoscopy pre educational guidelines implementation compared to 73.3 % of them at post educational guidelines implementation with (p value =0.012*)and clarifies that there was a positive and significant correlation between total nurses' knowledge with their total practice regarding patients' safety undergoing bronchoscopy post educational guidelines implementation with p-value of (0.023*), studied nurses had a competent level of total practice regarding patients' safety undergoing bronchoscopy with (p value =0.048*).**Conclusion** There was highly statistically significant improvement of nurses' knowledge and total nurses' practice regarding patients' safety undergoing bronchoscopy post implementing the educational guidelines .**Recommendation :**A similar study should be replicated on large sample and other places to generalize the findings.

Key words: nurses' performance, patients' safety, bronchoscopy, educational guideline

1.Introduction

Bronchoscopy is an invasive procedure that permits the direct examination of the larynx, trachea, and bronchi using either a flexible fiberoptic bronchoscope or a rigid metal bronchoscope. It is performed by a trained practitioner (pulmonologist or thoracic surgeons). It is also a procedure that uses a bronchoscope to examine the inside of the trachea, bronchi, and lungs. It is a thin tube-like instrument with a light and a lens for viewing. It may also have a tool to remove tissue to be checked under microscope for signs of disease. It is inserted through the nose or mouth [42].

The era of bronchoscopy began in 1876 with Gustav Killian inserting an esophagoscope into a farmer's airway to remove a piece of a pork bone. Today that procedure of bronchoscopy has evolved into a super-specialty of interventional pulmonology. Several innovators, scientists, and physicians have made invaluable contribution in bringing the procedure of bronchoscopy to its current eminence. Flexible bronchoscopy has opened the doors for number of minimally invasive procedures improving the welfare of patients. Interventional pulmonologists and the thoracic surgeons are teaming up to expand and exploit the boundaries of bronchoscopy to innovate safe and cost-effective diagnostic and therapeutic modalities [53].

Patient safety has emerged from the health care quality movement that is equally abstract, with various approaches to the more concrete essential components. Emphasis is placed on the system of care delivery that prevents errors; learns from the errors that do occur;

and is built on a culture of safety that involves health care professionals, organizations, and patients. The glossary at the AHRQ Patient Safety Network Web site expands upon the definition of prevention of harm: "freedom from accidental or preventable injuries produced by medical care [46].

The nurses are responsible for Securing informed consent, obtaining medical history, checking for NPO status, monitoring vital signs, providing oral hygiene, administering preoperative medications as ordered, preparing for local anesthesia, relieving anxiety, and preparing emergency resuscitation equipment at the bedside. During the procedure the nurses are responsible for the client right position , providing assistance with the diagnostic procedure and/or treatment and securing specimen . After the procedure the nurse should be aware of assessing bleeding episode, assessing respiratory status, monitoring vital signs, putting the patient in the right position, reinforcing diets, preventing aspiration, relieving anxiety and providing comfort measures [3].

Clinical guidelines are defined as "systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances". As a source of readily available evidence, rigorously synthesized and interpreted by expert clinicians and methodologists, guidelines are part of an evidence-based practice toolkit which, transformed into practice recommendations, have the potential to improve both the process of care and patient outcomes [53]

Significance of the study

Lung disease deaths in Egypt reached 2.50% of total deaths. The age adjusted death rate is 20.69 per 100,000 of population ranks in Egypt (WHO, 2020). The number of patients undergoing bronchoscopy in Benha university hospitals through year 2023 were 540 patients, (Benha University Hospitals statistical records, 2023).

The study conducted in faculty of nursing Alexandria University El-okda, (2018) about Assessment of Safety Measures Provided for Patients Undergoing Bronchoscopy is recommended for further research about developing standards of safe bronchoscopy nursing care. The study conducted in faculty of nursing Assuit University Ahmed, (2020) about (Assessment for Nurses' Knowledge and Practice for Patient Undergoing Bronchoscopy (Suggested Nursing Care Guideline) recommended continuous nursing training in chest and bronchoscopy department.

Compliance with patient's safety is very important especially in surgical area such as in chest department. In this department the nurses should follow the safety precaution to protect patient from health care hazards. Therefore, it is important to conduct this study to enhance nurses' performance regarding patients' safety undergoing bronchoscopy.

Aim of the study

This study aims to evaluate the effect of educational guidelines on nurses' performance regarding patients' safety undergoing bronchoscopy: - through the following.

1-Assess nurses' performance related to patient's safety undergoing bronchoscopy.

2-Design educational guideline for nurses regarding patients' safety undergoing bronchoscopy.

3-Evaluate nurses' performance after implementing educational guidelines for nurses regarding patients' safety undergoing bronchoscopy.

Research Hypotheses

1-There may be a positive change on the level of nurses' knowledge post implementing the guideline than before.

2-There may be a positive change on the level of nurses' practices after implementing the guideline than before.

3- There may be statistically significance relation between demographic data and nurses' performance.

4-There may be positive correlation between nurses' knowledge and practice after implementing the guidelines.

Subject and Method

Study Design

A quasi-experimental research design was utilized to achieve the aim of this study.

Setting

This study was conducted in chest department at Benha University Hospital, Qalyubiyah Governorate, Egypt. There was one chest department which is located on the third floor at the main building and

consisted of three wards one male , one for female and bronchoscopic room for bronchoscopic procedure

Subject

The study included 33 nurses who represent all nurses who were working at the above-mentioned setting after adjustment for a dropout 10% for the pilot study, the sample size was 30 nurses.

Tools for data collection:

Two tools were used to collect data for this study to achieve the aim of the study.

Tool I: Nurses' structured questionnaire

This tool was developed by the researcher after review of literatures to assess nurses' knowledge regarding patients' safety undergoing bronchoscopy and it was presented in simple Arabic items. It was consisting of two parts.

Part 1: Personal data for nurses: -This part aimed to identify nurses' personal data such as: nurses' age, gender, qualifications, job description, years of experience and training courses related to patients' safety undergoing bronchoscopy.

Part 2: Nurses' knowledge assessment: -This part was adapted from Ahmed et al, (2020) and modified by the researcher, it aimed to assess nurses' knowledge related bronchoscopy and patients' safety undergoing bronchoscopy, it consisted of the following three section of MCQ questions.

Section 1: Covered nurses' knowledge about bronchoscopy. It consists of 8 questions.

Section 2: Covered nurses' knowledge about nurses' knowledge regarding patients' safety undergoing bronchoscopy. It consists of 9 questions.

Section 3: Covered nurses' knowledge related nurses' roles for bronchoscopy. It consists of 7 questions.

Scoring system

All knowledge variables were multiple choice questions. Each correct answer was scored (1) and each incorrect answer scored (0). The total score converted into percentage and graded as the following:

Total knowledge= 24

Satisfactory $\geq 80\%$ ≥ 19 score

Unsatisfactory $< 80\%$ < 19 score

Tool II: Observational checklist regarding patients' safety undergoing bronchoscopy.

This tool was adapted by Ahmed, (2020) and modified by the researcher to assess nurses' practice regarding patients' safety undergoing bronchoscopy. It involved three phases.

1. patient before the procedure of bronchoscopy (include 28 steps)

* Nursing role before bronchoscopic procedure (Sign in phase included 15)

* Bacteriological safety measure (7).

* Psychological safety measures (6).

2-Patient safety for patient during the procedure of bronchoscopy (include 19steps)

* Nursing role during bronchoscopic procedure (Time out phase included 12)

*Psychological safety measures (2).

*Bacteriological safety measures (Infection control) (5).

3-Patient safety for patient after the procedure of bronchoscopy (include 23 steps)

*Nursing role after bronchoscopic procedure (Sign out phase) (16)

*Psychological safety measures (3)

*Disinfection in between patients reprocessing (4)

Scoring system

The score distributed as: two marks for each step done completely, one mark for each step done incompletely and zero mark for each step not done. The total score converted into percentage and graded as the following:

Total practice = 140

Competent $\geq 85\%$ ≥ 119 score

Incompetent $< 85\%$ < 119 score

The educational guidelines regarding patients' safety undergoing bronchoscopy.

This guidelines was designed by the researcher after review of literatures. It contained bronchoscopy's definition, uses, diseases which used for and possible complication of it. It also contained role of nurses in pre, during and post bronchoscopy and precautions for patients' safety.

Tools validity

The tools and the program were revised and ascertained by a panel of five experts, they were three assistant professor and two lectures of medical surgical nursing, Faculty of Nursing, Benha University. Their opinions were regarding the content, format, layout, consistency, accuracy and relevancy of the tools. According to their opinion minor modifications were applied.

Reliability

For the second tool practice, reliability was 0.962. This only proves that this tool is an instrument with good reliability.

Ethical considerations:

The approval of scientific research ethics committee at the college, the approval of the dean of the college, the head of chest department and the nursing supervisor in the department also nurses' approval was taken after an explanation about the purpose of the study; they also informed them that their participation is optionally, and that they have the right to withdraw at any time without any consequences. Then, written consent was obtained from each participant enrolled into the study. The researcher assured maintaining anonymity and confidentiality of data. All information was gathered used only for the purpose of the study.

Pilot study

Was conducted on 10% (3 nurses) of total sample to evaluate the applicability and clarity of tools, according to statistical analysis of pilot study, modification will be done as needed. This pilot study was done two weeks before starting the study. the time needed to fill in the tool was about (30-45) minutes

divided as (15-30) minutes for the first tool and (10-15) minutes for the second tool.

Field work:

I. Preparatory phase and assessment Phase:

This phase included reviewing the available literature and different studies related to research problem, and theoretical knowledge of its various aspects of the study, using textbooks, evidence-based articles, internet periodicals and magazines in order to collect tools of this study.

Permission for data collection in previous mentioned settings were obtained from dean of Benha faculty of nursing and the hospitals administrative personnel and approval consent will be granted from the nursing supervisor of chest department from previous settings. Meeting and discussion were held by the researcher and nurses to let them be aware of the aim, nature and objective of study, as well as, to get better cooperation during data collection.

Assessment of the nurses' practical skills and knowledge was done in the morning shift through self-administered questionnaire (Tool I) which was given to each nurse to fill it and time required for completion of questionnaire was ranged from 15-30 minutes.

Assessment of the nurses' practical skills through observational checklist for nurses' performance (Tool II) was done at the time of nurses preparation for bronchoscopy, during bronchoscopy and after bronchoscopy.

II-Planning phase: -

Based on finding of assessment phase the researcher developed educational guidelines according to nurses' needs and deficiency to improve their knowledge and practice regarding patients' safety undergoing bronchoscopy.

Teaching methods included lecture of simplified instruction followed by discussion, brainstorming and demonstration and remonstrations for practice training.

Media for teaching and training included booklet, picture, and videos through laptop and mobile.

III-Implementation phase: -

Total number of the studied nurses was 30, they were divided into 6 groups, each group contained 5 nurses in every session. The researcher attended three days/ week in the morning shift. The researcher met every group for four sessions Two session for knowledge and two sessions for performance. Each session ranged between 15-20 minutes, including the period of discussion.

An orientation to the intervention and its process were presented. Each session was started with a summary about what had been given through the previous session, then the objectives of the new topics, taking into consideration the use of simple language to suit the level of the nurses' education.

Discussion motivation and reinforcement during the intervention session were used to enhance learning. At the end of each session the researcher allowed to nurse to ask questions to correct any misunderstand.

At the end of the guidelines received notes from nurses and thanked them for their cooperation. The researcher asked them about their opinion on the guidelines and their benefits from the subject, then distributed the questionnaire to do another test.

IV- Evaluation phase: -

After implementation the guidelines the post test was administered to evaluate the effectiveness of the guidelines through evaluation nurses' knowledge using self-administered questionnaire (Tool I) and performance through observational checklist (Tool II) was done immediately and after one month.

Comparison was done between pretest and post-test at the end of the study to determine the effectiveness of designed guidelines on the nurses' knowledge and performance regarding patients' safety undergoing bronchoscopy.

Statistical Analysis

Data analysis was performed using the SPSS software (version 25). For determining the normal distribution of quantitative variables was used to Kolmogorov-Smirnov test. Qualitative data was presented as a number and percent. Furthermore, quantitative data was described as mean or standard deviation, as appropriate. Chi-square test was used to examine the difference and relation between qualitative variables during different periods. McNemar test for differences on dependent variable between two different periods. Spearman method was used to test correlation between numerical variables. A p-value < 0.05 was considered significant, and <0.001 was considered highly significant.

Results

Table (1): Percentage distribution of studied nurses according to their personal data, this table reveals that of 66.7% of studied nurses were within 30-40 years old with a mean age was 30.86 ± 0.57 years. Concerning gender, 76.7 % of the studied nurse were female. As for qualification, 70.0% of them had Bachelor of Nursing, 93.3% of them occupied as a nurse and 56.6 % had 5- <10 years of experience working in bronchoscopy unit with 96.7% didn't attend any previous training program for safety of patients undergoing bronchoscopy since < one year among 100.0 % of them.

Table (2): Distribution of total nurses' knowledge level related patients' safety undergoing bronchoscopy pre and post implementing the educational guidelines, this table show that total knowledge related patients' safety undergoing bronchoscopy was improved to 80.0 % compared to 43.3 % pre-educational guidelines, and it has the highest satisfactory level.

Fig (1): Difference between total nurses' knowledge level related patients' safety undergoing

bronchoscopy pre and post implementing the educational guidelines, this figure illustrates that 43.3% of studied nurses had a satisfactory level of total knowledge about patients' safety undergoing bronchoscopy pre-educational guidelines implementation compared to 73.3 % of them at post educational guidelines implementation with (p value =0.012*).

Table (3): Nurses' practice regarding patients' safety undergoing bronchoscopy pre and post educational guidelines, this table clarifies that there was a significant difference in total practices levels, while competent nurses' practice related patients' physical safety measures pre-guidelines (26.7%) improved to (60.0%) post guidelines.

Fig (2): Difference between nurses' total practice level related patients' safety undergoing bronchoscopy pre and post implementing the educational guidelines, this figure illustrates that 23.3 % of studied nurses had a competent level of total practice patients about safety undergoing bronchoscopy pre-educational guidelines implementation compared to 70.0 % of them at post educational guidelines implementation with (p value =0.048*).

Table (4) : Relation between total nurses' knowledge with their personal data pre and post implementing the educational guidelines, this table clarifies that there was statistically significant relation between total nurses' knowledge with their age, qualification and their years of experience during pre-educational guidelines implementation with p value = (0.035* 0.034* & .016*, respectively), and also post educational guidelines with (p= 0.002*,0.012*& 0.009*, respectively).

Table (5) : Relation between total nurses' practice with their personal data pre and post implementing educational guidelines ,this table shows that there was statistically significant relation between total nurses' practice with their age, qualification and their years of experience during pre-educational guidelines implementation with p value = (0.034* 0.008* & ,0.009*, respectively), and also post educational guidelines with (p= 0.002*,0.012*& 0.025*, respectively).

Table (6) Correlation between total knowledge and practice among nurses during pre and after implementing educational guidelines, this table clarifies that there was a positive significant correlation between total nurses' knowledge with their total practice regarding patients' safety undergoing bronchoscopy post educational guidelines implementation with p-value of (0.023*), while there was no significant correlation (p=0.747 n.s) pre educational guidelines implementation.

Table (1) Percentage distribution of studied nurses according to their personal data (n = 30)

Nurses' personal data	No.	%
Age / years		
20-<30	7	23.3

30- < 40	20	66.7
40-<50	3	10.0
Mean ± SD	30.86 ± 0.57	
Gender		
Male	7	23.3
Female	23	76.7
Qualification		
Diplom	3	10.0
Nursing Technical institute	3	10.0
Bachelor of Nursing	21	70.0
Nursing diploma	3	10.0
Occupation		
Nurse	28	93.3
Nursing supervisor	2	6.7
Years of Experience working in bronchoscopy unit		
< 5 years	5	16.7
5->10 years	17	56.6
10 - >15 years	6	20.0
≥ 15 years	2	6.7
Mean ± SD	10.16 ± 0.79	
Attending previous training program for safety of patients undergoing bronchoscopy		
Yes	1	3.3
No	29	96.7
If yes, since	(n=1)	
< one year	1	100.0

Table (2) Distribution of total nurses' knowledge level related patients' safety undergoing bronchoscopy pre and post implementing the educational guidelines(n=30)

Total knowledge	Response	Knowledge (pre guidelines) n= 30		Knowledge (post guidelines) n= 30		McNemar test P value
		(No.)	%	(No.)	%	
Basic knowledge related bronchoscopy	Satisfactory ≥ 80%	10	33.3	21	70.0	9.091 0.001**
	Unsatisfactory < 80%	20	66.7	9	30.0	
Safety of patient undergoing bronchoscopy	Satisfactory ≥ 80%	13	43.3	24	80.0	6.667 0.007*
	Unsatisfactory < 80%	17	56.7	6	20.0	
Nurses role of core for patient before, during and after bronchoscopy	Satisfactory ≥ 80%	12	40.0	23	76.7	7.692 0.003*
	Unsatisfactory < 80%	18	60.0	7	23.3	

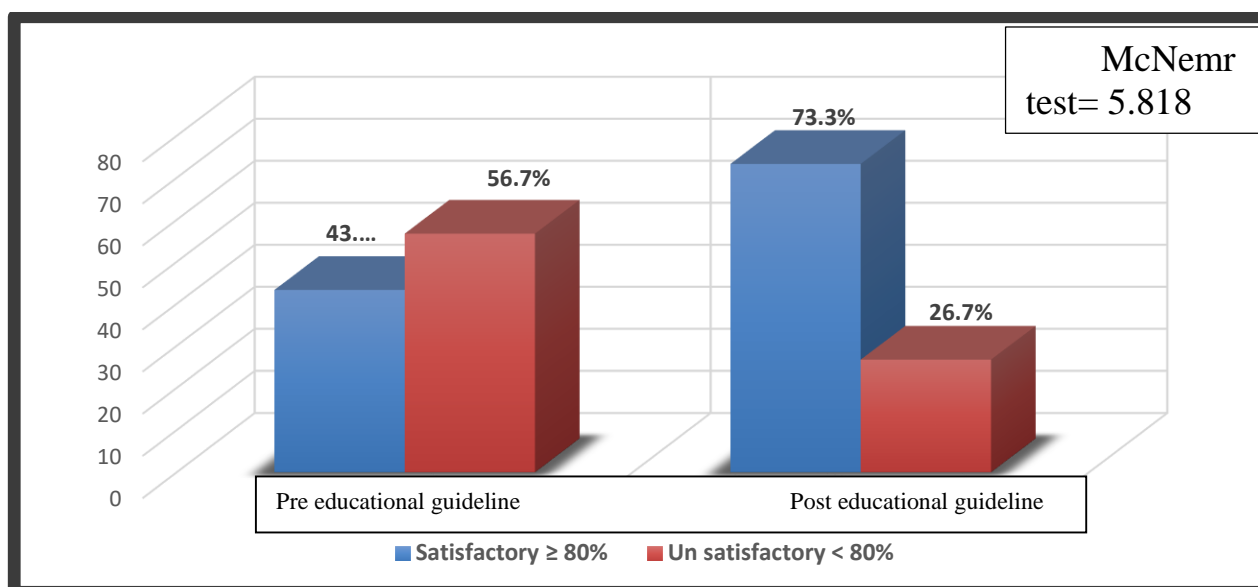


Fig. (1) Difference between total nurses' knowledge level related patients' safety undergoing bronchoscopy pre and post implementing the educational guidelines (n=30)

Table (3) Nurses' practice regarding patients' safety undergoing bronchoscopy pre and post educational guidelines.

Nurses' practice		Practice (pre guidelines) n= 30	(Practice post guidelines) n= 30	Mc nemar test	P value
(Sign in phase) Related patients' physical safety measures through before bronchoscopy	Competent $\geq 85\%$	8 (26.7)	18(60.0)	7.273	0.007*
	Incompetent $85\% <$	22(73.3)	12(40.0)		
Related patients' bacteriological safety measures through before bronchoscopy	Competent $\geq 85\%$	8(26.7)	19(63.3)	6.316	0.012*
	Incompetent $85\% <$	22(73.3)	11(36.7)		
Related patients' psychological safety measure through before bronchoscopy	Competent $\geq 85\%$	10(33.3)	23(76.7)	4.565	0.033*
	Incompetent $85\% <$	20(66.7)	7(23.3)		
(Time out phase) Related patients' physical safety measures through during bronchoscopy	Competent $\geq 85\%$	17(56.7)	26(86.7)	6.036	0.014*
	Incompetent $85\% <$	13(43.3)	4(13.3)		
Related patients' bacteriological safety measures through during bronchoscopy	Competent $\geq 85\%$	23(76.7)	28(93.3)	7.041	0.008*
	Incompetent $85\% <$	7(23.3)	2(6.7)		
Related patients' psychological safety measures through during bronchoscopy	Competent $\geq 85\%$	10(33.3)	22(73.3)	5.455	0.020*
	Incompetent $85\% <$	20(66.7)	8(26.7)		
(sign out phase) Related patients' physical safety measures through after bronchoscopy	Competent $\geq 85\%$	14(46.7)	24(80.0)	6.563	0.010*
	Incompetent $85\% <$	16(53.3)	6(20.0)		
Related patients' bacteriological safety measures through after bronchoscopy	Competent $\geq 85\%$	14(46.7)	25(83.3)	5.250	0.022*
	Incompetent $85\% <$	16(53.3)	5(16.7)		
Related patients' psychological safety measures through (after bronchoscopy	Competent $\geq 85\%$	15(50.0)	24(80.0)	7.500	0.006*
	Incompetent $85\% <$	15(50.5)	6(20.0)		

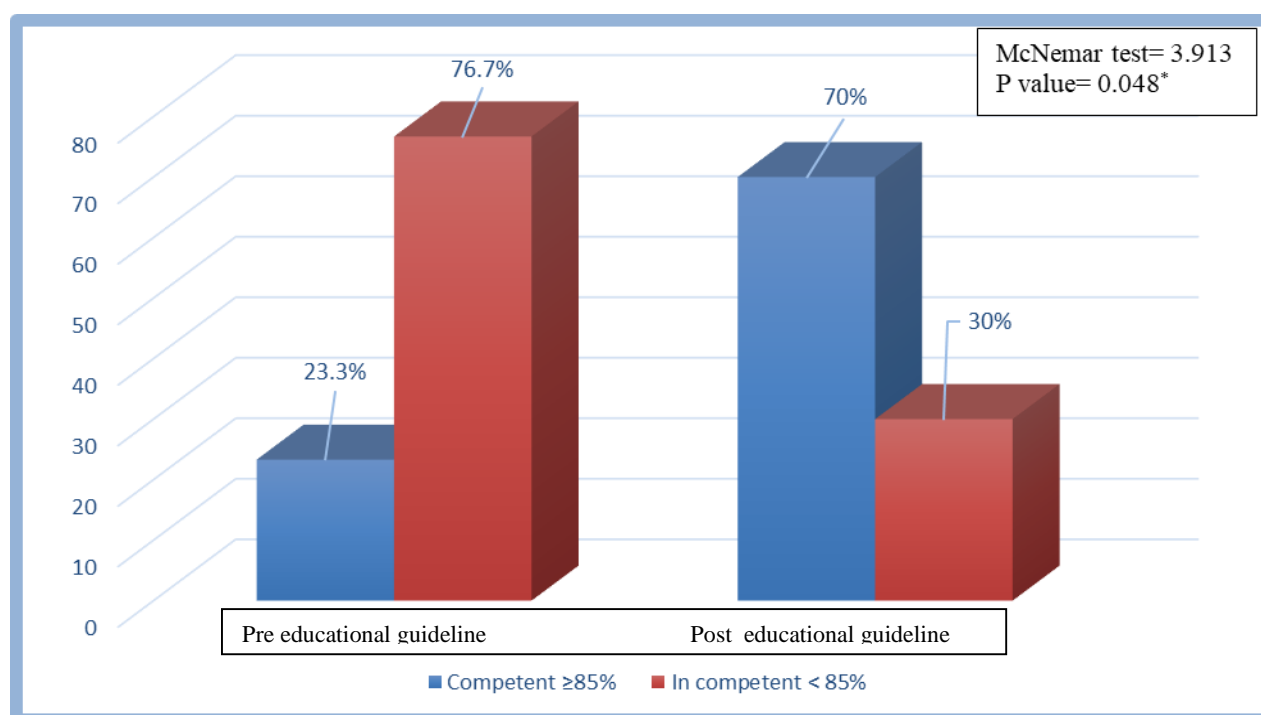


Fig. (2) Difference between nurses’ total practice level related safety of patients undergoing bronchoscopy pre and post implementing the educational guidelines (n=30)

Table (4) Relation between total nurses’ knowledge with their personal data pre and post implementing the educational guidelines (n=30)

Nurses’ Personal data	Variables	Total knowledge level		X ² Test P value	Post guidelines		X ² Test P value
		Pre guidelines Satisfactory ≥ 80% No. (%)	Un Satisfactory < 80% No. (%)		Satisfactor y ≥ 80% No. (%)	Un Satisfactory < 80% No. (%)	
Age	20-<30	6(46.2)	1(5.9)	6.690	0(0.0)	7(53.8)	12.896
	30- < 40	6(46.2)	14(82.4)	0.035*	14(82.4)	6(46.2)	0.002*
	40-<50	1(7.6)	2(11.7)		3(17.6)	0(0.0)	
Gender	Male	3(23.1)	4(23.5)	0.001 0.	4(23.5)	3(23.1)	0.001
	Female	10(76.9)	13(76.5)	977n.s	13(76.5)	10(76.9)	0.977 n.s
Qualification	Diplom	0(0.0)	3(17.6)		0(0.0)	3(23.1)	10.995
	Nursing	0(0.0)	3(17.6)		0(0.0)	3(23.1)	0.012*
	Technical institute			8.668 0.034*			
Occupation	Bachelor of Nursing	10(76.9)	11(64.8)		14(82.4)	7(53.8)	
	Nursing diploma	3(23.1)	0(0.0)		3(17.6)	0(0.0)	
	Nurse	13(100.0)	15(88.2)	1.639	16(94.1)	12(92.3)	0.039
Years of experience	Nurse supervisor	0(0.0)	2(11.8)	0.201 n.s	1(5.9)	1(7.7)	0.844n.s
	< 5 years	1(7.7)	4(23.5)	10.333	0(0.0)	4(30.8)	11.674
	5-< 10 years	5(38.4)	12(70.6)	0.016*	9(52.9)	9(69.2)	0.009*
	10 - <15 years	6(46.2)	0(0.0)		6(35.3)	0(0.0)	
Attending previous training program for safety of patients undergoing bronchoscopy	≥ 15 years	1(7.7)	1(5.9)		2(11.8)	0(0.0)	
	Yes	1(7.7)	0(0.0)		0(0.0)	1(7.7)	1.353
	No	12(92.3)	17(100.0)	1.353 0.245 n.s	17(100.0)	12(92.3)	0.245 n.s

(n.s) Not Statistically Significant at >0.05 (*) Statistically Significant at ≤0.05

Table (5) Relation between total nurses' practice with their personal data pre and post implementing educational guidelines (n=30)

Nurses' Personal data	variables	Total practice level					X ² Test P value
		Pre guidelines Competent	In competent	Post guidelines Competent	In competent	X ² Test P value	
		≥ 85% No. (%)	< 85% No. (%)	≥ 85% No. (%)	< 85% No. (%)		
Age	20-<30	0(0.0)	7(30.4)	6.284	0(0.0)	7(53.8)	12.896
	30- < 40	5(71.4)	15(65.2)	0.034*	14(82.4)	6(46.2)	0.002*
	40-<50	2(28.6)	1(4.3)		3(17.6)	0(0.0)	
Gender	Male	3(42.9)	4(17.4)	1.946 0.	4(23.5)	3(23.1)	0.001
	Female	4(57.1)	19(82.6)	163n.s	13(76.5)	10(76.9)	0.977 n.s
Qualification	Diplom	0(0.0)	3(13.1)		0(0.0)	3(23.1)	10.995
	Nursing	0(0.0)	3(13.1)		0(0.0)	3(23.1)	0.012*
	Technical institute			11.899			
Occupation	Bachelor of Nursing	4(57.1)	17(73.8)	0.008*	14(82.4)	7(53.8)	
	Nursing diploma	3(42.9)	0(0.0)		3(17.6)	0(0.0)	
	Nurse	7(100.0)	21(91.3)	0.652	16(94.1)	12(92.3)	0.039
Years of experience	Nurse supervisor	0(0.0)	2(8.7)	0.419 n.s	1(5.9)	1(7.7)	0.844 n.s
	< 5 years	0(0.0)	4(17.4)	11.677	0(0.0)	4(30.8)	9.359
	5-< 10 years	2(28.6)	16(69.6)	0.009*	11(64.7)	7(53.8)	0.025*
Attending previous training program for safety of patients undergoing bronchoscopy	10 - <15 years	3(42.9)	3(13.0)		4(23.5)	2(15.4)	
	≥ 15 years	2(28.6)	0(0.0)		2(11.8)	0(0.0)	
Attending previous training program for safety of patients undergoing bronchoscopy	Yes	0(0.0)	1(4.3)		0(0.0)	1(7.7)	1.353
	No	7(100.0)	22(95.7)	0.315	17(100.0)	12(92.3)	0.245 n.s
				0.575 n.s			

(n.s) Not Statistically Significant at >0.05 (*) Statistically Significant at ≤0.05

Table (6) Correlation between total knowledge and practice among nurses during pre and after implementing educational guidelines (n=30)

variable	Periods	Total knowledge	
		R	p- value
Total practice	Pre-guideline	0.061	0.747 n.s
	Post-guideline	0.414	0.023*

(n.s) Not statistically significant at p> 0.05(*) Statistically Significant at ≤0.05

Discussion

To achieve the aim of the study, the finding discussion of the result was presented into the following parts: Part I: Personal data of studied nurses. Part II. Nurses' knowledge about safety of patients undergoing bronchoscopy. Part III: Nurses' practice regarding safety of patient undergoing bronchoscopy. Part IV. Relation and correlation between nurses' personal data with total knowledge and practice.

Part I: Personal data of studied nurses (n=30):

In the current study, there was more than two third of studied nurses were within 30- <40 years with a mean age of 30.86 ± 0.57 years. Concerning gender, three quarters of the studied nurses were female. As for qualification, more than two third of them had Bachelor of Nursing, most of them occupied as a nurse

and more than half had 5- >10 years of experience working in bronchoscopy unit with most of them didn't attend any previous training program for safety of patients undergoing bronchoscopy since < one year among all of them.

As well, **Abd-Elhamid et al., (2016) [1]** who studied the effect of an educational program on improving nurse's knowledge and practice regarding infection control in endoscopy unit at Zagzig University Hospital. They revealed that two third of nurses were in the age group of more than 40 years with mean age 42.2 ± 8.4 years. In relation to the training more than three fifth of them were not receive any training. Meanwhile ninety percent of the sample had completed their Secondary nursing school education while tenth had bachelor's in nursing. As

regards to occupation, majority of studied nurses were staff nurse. As well as most of the sample had more than 10 years of experience with mean 23.8 ± 8.6 years. Also, three fifth of nurses had medical examination pre working, while only tenth of them had medical examination during working.

Part II. Nurses' knowledge about safety of patients undergoing bronchoscopy:

In our study, according to distribution of nurses' knowledge about bronchoscopy pre and post implementing the educational guidelines, we reported that there was a statistical significant difference regarding total knowledge about nurses' role of care for the patient before, during and after bronchoscopy between pre and post implementing educational the guidelines ($p = 0.003^*$), had satisfactory more than three quarter level of knowledge post educational guidelines implementation compared to two fifth pre educational guidelines.

In consistent with our results, **Ahmed et al., [3]** discovered that, when asked about their level of nursing preparation for bronchoscopy, three-quarters of nurses gave answers that were entirely satisfactory.

According to our findings, there was a difference in the overall nurses' knowledge regarding the safety of patients undergoing bronchoscopy between pre and post implementation of the educational guidelines. Approximately 25% of the studied nurses had a satisfactory level of overall knowledge regarding the safety of patients undergoing bronchoscopy prior to the implementation of the educational guidelines, compared to less than 75% of them after the guidelines were implemented (p -value = 0.012*)

Part III: Nurses' practice regarding safety of patient undergoing bronchoscopy:

The study clarified that there was a significant difference in total practices levels, while competent nurses' practice related patients' physical safety measures pre-guidelines more than quarter improved to two third post guidelines.

In supporting our results, **Abd-Elhamid et al., [1]** revealed a significant statistical enhancement in the overall knowledge of nurses regarding infections in general, nosocomial infections, disinfection principles, infection control precautions, and endoscopy reprocessing. This improvement was observed at $P \leq 0.01$.

Part IV. Relation and correlation between nurses' personal data with total knowledge and practice:

In the results of current study, in term of relation between total nurses' knowledge with their personal data pre and post implementing the educational guidelines, there was statistically significant relation between total nurses' knowledge with their age, qualification and their years of experience during pre-educational guidelines implementation with p value = (0.035* 0.034* & ,0.016*, respectively), and also post educational guidelines with ($p = 0.002^*, 0.012^* \& 0.009^*$, respectively).

In term of relation between total nurses' practice with their personal data pre and post implementing educational guidelines, there was statistically significant relation between total nurses' practice with their age, qualification, and their years of experience during pre-educational guidelines implementation with p value = (0.034*, 0.008* & 0.009*, respectively), and post educational guidelines with ($p = 0.002^*, 0.012^* \& 0.025^*$, respectively).

In consistent with the results of current study, **Ahmed et al., (2020)** found that regarding the relation between nurses' knowledge and practice with demographic data, the exciting study showed that there was no statistically significance deference between nurses' knowledge and practice with their demographic characteristics except regarding marital status (p -value 0.028) and age group while, the good level of knowledge was among the age group more than 35 years old and married nurses. This might be due to nurses who have more experience responsible for administrative activities and the younger newly graduated who recently attained training programs and fresh knowledge.

6. Conclusion

There was highly statistically significant improvement of nurses' knowledge and total nurses' practice regarding patients' safety undergoing bronchoscopy post implementing the educational guidelines.

7. Recommendation

A similar study should be replicated on large sample and other places to generalize the finding.

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