Effect of Self-learning Module on Nurses' Knowledge and Safety Practices Concerning Care of Patients Undergoing Upper Gastrointestinal Endoscopy

Nora Salah Eldin Saad [(1)], Ola Abdelwahab Abdallah Srour [(2)]

(1,2) Lecturers of Adult Health Nursing, Faculty of Nursing, Helwan University, Egypt

*Corresponding author: olasrour01 @gmail.com OR drolasrour@yahoo.com

Abstract

Upper gastrointestinal endoscopy plays a major role in diagnosis and management of upper gastrointestinal disorders . Endoscopy nurses play a critical role in ensuring that endoscopy is both safe and of high-quality**. Aim:** evaluate the effect of self-learning module on nurses' knowledge and safety practices concerning care of patients undergoing upper gastrointestinal endoscopy. **Design:** A quasi experimental research design (pre and post-test) was utilized. **Setting:** in the endoscopy unit at Homeyat Elabassia Hospital**. Sample:** A convenient sample of all available nurses (60 nurse) working at the previously mentioned setting**. Tools of the study:** Two tools were used, the first tool was structured self-administrated questionnaire: it was consisted of two parts; demographic characteristics of nurses and nurses' Knowledge. The second tool was nurses' safety practices observational checklist. **Results:** Mean age of studied nurses was 27.9 ± 4.71. 23.3% of the studied nurses had satisfactory level of knowledge pre implementation of self-learning module which increased to 76.7% post implementation with a highly statistically significant differences between pre and post implementation at p=0.000. A highly statistically significant difference of total nurses' safety practices between pre and post self-learning module implementation among the studied nurses. There was a direct statistically significant correlation between total knowledge and total safety practices of studied nurses. **Conclusion:** There was a positive effect of self-learning module on nurses' knowledge and safety practices and there were highly statistically significant differences in total nurses mean score of knowledge and practices between pre and post implementation of self-learning module. **Recommendations:** Periodic in-service training to maintain and update level of knowledge and safety practices of nurses working at endoscopy unit**.**

Keywords: Nurses' Knowledge, Safety practices , Self-learning module ,Upper gastrointestinal endoscopy.

Introduction

Upper gastrointestinal (GI) endoscopy procedures continue to increase in volume as innovative therapeutic endoscopy procedures are performed to meet the increasing demand for minimally invasive procedures. Endoscopy has been regarded as the gold standard treatment for the diagnosis of upper GI tract diseases and is widely performed worldwide. Endoscopic procedures are invasive and may cause the patient pain and discomfort **(Early, Lightdale and Vargo ,2018).**

Upper Gastrointestinal (UGI) Endoscopy is a diagnostic procedure in which a flexible fiber optic tube passed into the esophagus, stomach and upper small intestine depending on the level at which lesions are anticipated to examine the upper GI tract. It is a valuable tool in the diagnosis and management of

diseases affecting the esophagus, stomach and upper parts of the duodenum **(El-Maghawry and El-Hawy ,2019).** Upper G.I. endoscopy has a unique value in the diagnosis of various upper G.I. conditions by permitting, apparition, imaging, ultrasonography, and biopsies of suspicious lesions. Esophagitis, gastritis, duodenitis, upper G.I. bleeding, vascular malformations, peptic ulcer disease (PUD) and gastroesophageal reflux disease (GERD) along with various diseases which upper G.I. endoscopy is used to aid the diagnosis **(Naqvi et al.,2019).**

Endoscopy is recommended as the first line of investigation for the patients presenting with upper gastro-intestinal symptoms. It affords an excellent view of mucosal surfaces of the oesophagus, stomach, and proximal duodenum. Observations are made looking for

focal benign or malignant lesions, diffuse mucosal changes, luminal obstruction, motility, and extrinsic compression by contiguous structures (**Puttaraju and Sreramaseshadri ,2019)**.

The benefits of endoscopy have increased enormously as it has matured from a purely diagnostic tool to become a therapeutic subspecialty, but it has the potential for causing harm. Major complications as esophageal or gastric perforation, hemorrhage, oversedation, and cardiorespiratory events. Minor complications as incomplete procedure due to poor patient toleration, abdominal discomfort, belching and sore throat. Infection also result from either the procedure itself or failure to follow guidelines for the reprocessing and use of endoscopic devices and accessories. **(Thandassery et al., 2015).**

Patient safety is the absence of preventable harm to a patient during the process of health care, a component and a result of good quality health services and quality of care and improved health outcomes and health status. **Singh, et al., (2014),** appreciated that patient harm due to counter events is one of the top 10 causes of death and incompetence in the world. Many medical practices and risks associated with health care are emerging as major challenges for patient safety and contribute significantly to the burden of harm due to unsafe care; for example: medication errors, health care-associated infections, venous thromboembolism, unsafe surgical care procedures, unsafe injections practices given in health care settings that can transmit infections, including HIV and hepatitis B and C, and pose direct danger to patients and health care workers. **(Aitken & Gorokhovich, 2012).**

Safety in endoscopic procedure has been important in many reviews. Now, health staff focuses to present guideline for this procedure, to prevent infections after undergoing procedure of endoscopy. As guidelines of infection control, enough staffing, sedation in endoscopy, to introduce high quality indicators in GI endoscopy. These efforts ensure that developing, refining, and implementing procedure-associated quality indicators have

been helpful in promoting best practices among endoscopists and providing evidence-based care for the patients **(Park et al., 2015).**

The self-learning module (SLM) refers to self-instructional, self-explanatory, self-contained, self-directed, self-motivating and self-evaluating material to assess the achievement of the learner . Self-learning module is an orderly set of instructions designed to facilitate the learner's mastery of a body of knowledge or a procedure. When combined with other modules, learners can master a comprehensive body of knowledge or a complex process. Self- learning modules are useful for more than one purpose. For example, they can facilitate learning for individualized or self-paced instruction. They can also supplement traditional instruction in order to provide more thorough and/or additional training. Learners will realize the benefits of competency-based education, whether they use digital or print self-paced learning modules.**(Maile, & cooper, 2018).** Self- learning module is essential in assisting nurses to meet the challenges presented in today's health care environment. Nurse educators have an important role to play in assisting nurses to acquire the skills for self-learning module, and to do this they need to understand the concept of self- learning module **(Levett-Jones ,2015).**

Nurses are called backbone of hospitals and in other healthcare systems. They play vital and effective role in management of several diseases. During endoscopic procedures nurses have strong responsibilities regarding patient's treatment and their cures. **(Majeski, Lynch and Durst, 2019).** Endoscopy nursing has been developed as a discipline with a highly qualified nurses working alongside the endoscopist. Safety nursing measures should be considered in three time periods before, during and after endoscopy procedure to prevent any hazards or complications **(Metwally, Abou Donia, and Abdel Aziz,2016)**.

Nurses in endoscopy units have the responsibility to provide high quality endoscopy nursing care to gastroenterological patients. They responsible about all aspects of

patients care from admission to discharge, they must organize, able to set priorities and have an clinical experience in efficient endoscopy nursing care, support patients, ensuring their privacy, comfort, safety and directing them about their care Otherwise patients under endoscopy expect efficient and quality care from expert healthcare providers. Likewise, is critical to create an effective and comprehensive training in endoscopy **(Dunkley, et al., 2019).**

Significance of the study

With the ongoing technological advancements in the field of medicine, upper G.I. endoscopy is no longer just a screening or diagnostic procedure but it has a strong therapeutic value. There are an estimated 600,000 gastrointestinal endoscopy cases and 360,000 mortality every year in the European Union. According to estimates for the years 2000–2007, overall 5-years survival was 41%, with variations depending on the site of diagnosis.12 % for the esophagus, 24% for the stomach, 48% for colorectal cancer, and 6% for pancreas cancer (**Naqvi et al.,2019**). In Egypt, average endoscopy procedures are 15 million procedures per year **(Nabolsy, 2012).**

Nurses who follow the courses to keep up-dated are substantial in this field due to the continuous evolution of the endoscopic instruments and methods. The endoscopy-trained nurse must know the anatomy of the examined segments and integrate this knowledge with the care of the patients. Nurses should also get involved in the clinical investigations concerning endoscopy **(Amer et al., 2018).**

A gap aroused between the nurses knowledge and their safety practices regarding endoscopy procedures results in negative effects on patients with endoscopic complications. so the aim of the study is to evaluate the effect of self-learning module on nurses' knowledge and safety practices concerning care of patients undergoing upper gastrointestinal endoscopy.

Aim of the study

This study aimed to evaluate the effect of self-learning module on nurses' knowledge and safety practices concerning

care of patients undergoing upper gastrointestinal endoscopy through the following:

- Assessing the level of knowledge and safety practices concerning care of patients undergoing upper Gastrointestinal Endoscopy.
- Designing self-learning module for nurses caring for patients undergoing upper Gastrointestinal Endoscopy.
- Implementing self-learning module for nurses caring for patients undergoing upper Gastrointestinal Endoscopy.
- Evaluating the effect of implementing the self-learning module on nurses' knowledge and safety practices concerning care of patients undergoing upper Gastrointestinal Endoscopy.

Research hypotheses:

H1. Nurses' knowledge concerning care of patients undergoing upper gastrointestinal endoscopy will be improved after implementing the self-learning module.

H2. Nurses' safety practices concerning care of patients undergoing upper gastrointestinal endoscopy will be improved after implementing the self-learning module.

H3. There will be a positive correlation between nurses' knowledge and safety practices post implementing self-learning module.

Subjects and methods:

(I) Technical design

Research design:

A quasi-experimental research design (pre-posttest) was utilized to conduct this study.

A quasi-experimental research design are similar to true experiments, but they lack random assignment to experimental and control groups. Pre-test and post-test design is a form of quasi-experimental research in which the same dependent variable is measured in one group of participants before (pretest) and after (posttest) a treatment is administered **(Stratton, 2019).**

Setting:

The study was conducted in endoscopy unit at Homeyat Elabassia Hospital. The endoscopy unit consists of 2 rooms ; first room for pre endoscopic preparations which contains 20 beds and the second room for endoscopy and post endoscopy care that contain15 beds, and the numbers of occupied beds from15-17 beds/ day.

Sample:

A convenient sample of all available nurses working at the previously mentioned setting .The total number of nurses (60 nurse); with various ages, qualifications, years of experience, and different level of education.

Tools for data collection:

Tool (I): Structured self-administrated questionnaire:

This questionnaire was developed by researchers after reviewing the related and recent literatures **(Smith and Timby, 2018 ; Taylor, Lynn, and Bartlett, 2018 & El-Maghawry and El-Hawy 2019).**It was written in simple Arabic language for assessing nurses' demographic characteristics and knowledge level concerning care of patients undergoing upper gastrointestinal endoscopy. It was consisted of two parts:

Part (1): Demographic characteristics of nurses include **(**age, sex, education level and years of experience at gastrointestinal endoscopy unit).

Part (2): Nurses' Knowledge questionnaire regarding the care of patients undergoing upper gastrointestinal endoscopy, The total items of knowledge was composed of (30) item divided into 5 main domains which as ; Nurses' knowledge related to anatomy and physiology of gastrointestinal system (4 items), Nurses' knowledge related to definition & purpose of upper gastrointestinal endoscopy (6 items), Nurses' knowledge related to indications and contraindications of upper gastrointestinal endoscopy (5 items), Nurses' knowledge related to complications of upper gastrointestinal endoscopy (4 items) and nurses' knowledge related to nursing care for patients undergoing upper GI endoscopy (11 items) which included questions related to types of endoscopy and nursing role pre, during and after procedure.

The scoring system:

Knowledge obtained from nurses was scored and calculated as correct answer scored one grade and score zero for incorrect answer, The total score level for the questionnaire was 30 grades (equal 100%). The total grades were converted to percentage as follows:

- Total scores of ≥ 75% was considered a satisfactory level of knowledge

- Total scores of < 75% was considered unsatisfactory level of knowledge.

Tool (II): Nurses' safety practices observational checklist.

It was designed by the researchers after reviewing the related literature **Osman, Hassanin, and Salama (2014) and Decristoforo, et al., (2018)** to evaluate the nurses' level of safety practices through observing their practices concerning care of patients undergoing upper gastrointestinal endoscopy. It was divided into 3 main domains which as ; nurses' safety practices before endoscopy procedure included (23 step), nurses' safety practices during endoscopy procedure included (38 step) and nurses' safety practices after endoscopy procedure which consisted of (30 step) .

The scoring system:

Each step in the observational checklist was checked as done and not done. One mark for step done correctly, and zero for incorrect or not done step. The total nurses' practices score will be categorized into two levels as satisfactory level ≥ 85% and unsatisfactory level < 85% of total score .

(II)Operational design:

Preparatory phase

It included reviewing of recent related literature, different studies and theoretical knowledge of various aspects of the problems

using textbooks, articles, medical websites, periodicals and magazines that concern with the topic of GI endoscopy and role of nurse in every phase of care to develop the data collection tools.

Validity of tools

The study tools were tested for validity through the judgments of a 5 Juries; four experts in Adult Health Nursing department ,Helwan university and one medical expert in GI endoscopy unit to test the clarity of sentences, appropriateness, and completeness of the content and make sure that the tools used are measuring the purpose of the study. The same experts revised the self -learning module. There was no modification.

Reliability of the tools

The reliability test for the present study tools was established by using Cronbach's alpha which showed good internal consistency and good reliability as reliability coefficient for nurses' knowledge questionnaire was **(0.827)** and nurses' safety practices observational checklist was **(0.834).** Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1; higher values (more than 0.7) denote acceptable reliability.

Ethical Considerations

An informed oral consent was taken from studied nurses who agreed to participate in the research process after explaining all information related to the study (aim and activities, expected outcomes, as well as benefits and risks associated) before data collection. Confidentiality and anonymity were also guaranteed. Studied nurses were told the right to discontinue at any time without any consequences and without giving any reason. Values, culture, and beliefs would be respected. A code number was used instead of name.

Pilot study

A pilot study had been undertaken before starting the data collection phase. It was carried out on 10 % of participants (6 nurses) to test the applicability of the tools and to estimate the time needed to complete the tools. No modifications were done according to the pilot study. The

subjects included in the pilot study were included in the study sample.

Field work:

- An official letter from the dean of the Faculty of Nursing, Helwan University was taken and forwarded to the hospital director and nursing director of Homeyat Elabassia Hospital seeking permission to perform the study after clarifying the aim of the study.

- The process of data collection extended over 7 months from the beginning of November 2018 to the end of May 2019.

- The study was carried out through four phases; assessment, planning, implementation, and evaluation phase .

Assessment Phase:

- The researchers visited the endoscopic unit three days weekly at morning shift to collect the data by using previous tools. The endoscopic nurses were interviewed individually by the researchers after the researchers introduced themselves to initiate communication, explained the aim of the study and took their verbal approval to participate in the study prior to data collection.

- The researchers assessed the nurses' knowledge and safety practices concerning care of patients undergoing upper gastrointestinal endoscopy using structured self-administered questionnaire and safety practices observational checklist as following:

 First: The researchers explained structured self-administered questionnaire (Tool I). Then distributed it to all nurses individually to assess their knowledge regarding care of patients undergoing upper gastrointestinal endoscopy. The average time needed for the completion of a questionnaire by each nurse was between 30 – 40 minutes.

Second: The endoscopic nurse was observed at the endoscopy unit by the researchers to collect the data related to nurses' safety practices in the care of patients undergoing gastrointestinal endoscopy using observational checklist **(Tool II)**. It was filled in by the researchers before self-learning module (pre-

test). Each nurse was observed in the morning shift, for pre-procedure, during the procedure and post-procedure three times, and the mean (±SD) of these observations was estimated to assess the nurse's practices level. The average time needed for the completion of each observational checklist took about 45–60 minutes.

Planning   Phase   (Self-learning   module development)

- In this phase a designed self-learning module was developed by researchers based on nurses' needs assessment using structured self-administrated questionnaire and nurses' safety practices observational checklist as well as, literature review, **(Naqvi etal.,2019**; **Hinkle & Cheever, 2017 and Metwally et al.,2016)** and researchers' experience, and opinions of experts aiming to satisfy the studied nurses' deficit knowledge and practices about caring for patients with upper gastrointestinal endoscopy .

- The researchers determined the learning objectives and the learning content of the module as well as learner's activities and evaluation methods.

- The researchers designed self-learning module (an illustrative booklet and videos) on mobile about care of patients undergoing upper gastrointestinal endoscopy. The booklet was written in the Arabic language with illustrations for the purpose of improving nurses' knowledge and safety practices related to care for patients undergoing upper gastrointestinal endoscopy and involving theoretical and practical parts.

- ✓ **The theoretical part** included the aim and objectives of self-learning module and an overview about anatomy and physiology of gastrointestinal system ,definition & purpose of   upper   gastrointestinal   endoscopy, indications and contraindications of upper gastrointestinal endoscopy. Also it involved information about complications of upper gastrointestinal endoscopy and nursing care for patient undergoing upper GI endoscopy and instructions for patients before discharge from hospital.

- ✓ **The practical part** addressed nurses' safety practices before, during and after endoscopy

procedure . Before endoscopy , it included psychological   safety   ,   physical safety ,bacteriological safety and mechanical safety. Nurses' safety practices during endoscopy procedure, it included electrical safety, thermal safety, instrumental and mechanical safety and psychological safety, bacteriological and physical safety. Finally nurses' safety practices after endoscopy procedure which included psychological and physical safety as well as reprocessing of endoscopes and accessories equipment (cleaning   ,   disinfection   ,storage   of endoscopes and care of accessories).

Implementation Phase:

The self-learning module (booklet and Videos on mobile) was given to nurses (hard and soft copy) with clarification related to how the module is to be used. Contacts with the nurses were done through the interviewing in endoscopy unit and through telephone to explain some difficult points of the self-learning module which encountered the studied nurses during the time of the study.

Evaluation phase:

In this phase, the effect of self-learning module on studied nurses' knowledge and safety practices were done post one month of implementing the module using the same pretest tools.

Administrative Design:

To carry out the study, the necessary approvals were obtained from the hospital director and nursing director of Homeyat Elabassia Hospital. Official letters were issued to them from the Faculty of Nursing Helwan University explaining the aim of the study to obtain permission for the collection of data.

Statistical design:

The collected data were organized, coded, computerized, tabulated, and analyzed by using the Statistical Package for Social Science (SPSS) version (24). Data were presented using descriptive statistics in the form of frequencies, percentages, mean and standard deviation. Chi-square test (X^2) and T test was used detect the relation   between   the   variables.   Correlation coefficient (r) was used to test the relation between quantitative data. Graphs were done for

data visualization .The p-value is the probability that an observed difference is due to chance and not a true difference. A significant level value was considered when the p-value < 0.05 and a highly significant level value was considered when p-value< 0.001, while p-value > 0.05 indicates non-significant results.

Results

   Table (1) shows that 48.3% of studied nurses were 20<30 years old with a mean age of 27.9 ± 4.71 and   58.3% were female. As regarding educational level , 50 % of studied nurses graduated from nursing diploma. According to years of experience in the gastrointestinal endoscopy unit, 53.3% of studied nurses had experience 1<10 years.

   Table (2) denotes that, as regarding to total mean score of knowledge during the post-test phase, the studied nurses had high mean score of knowledge (24.97 ± 5.09) as compared with the phase of pre-test (15.35 ± 5.355). Moreover, there were a highly statistically significant differences in total knowledge regarding all domains when comparing between pre and post implementation of self-learning module with p value =0.000.

   Figure (1) displays that, there was noticeable progress of total satisfactory level of knowledge among studied nurses between pre and post self-learning module implementation. As the figure shows that only 23.3% of the studied nurses had satisfactory level of knowledge pre implementation which increased to 76.7% post implementation.

   Table (3): Demonstrates a highly statistically significant difference of total nurses' safety practices pre and post self-learning module implementation among the studied nurses with p value = 0.000** , whereas improvement was indicated post self-learning module implementation as compared to pre implementation (mean± SD = 65.6± 15.01, & 75.8 ± 13.19 respectively).

   Figure (2): Poses that, there was a radical satisfactory improvement in the studied nurses' total percentage of safety practices post implementing self-learning module to be 85% in the post-test rather than of 15% in the pre-test.

   Table (4) Reveals that there were highly statistically significant relation between nurses' educational level and the total knowledge level (P = 0.000). While, there were no statistical significant relation between age, sex, years of experience of studied nurses and total knowledge level.

   Table (5) Reveals that there were no statistically significant relations between studied nurses' demographic characteristics and total safety practices level except in relation to years of experience at gastrointestinal endoscopy unit and total safety practices' level as there was a statistically significant relation with (p = 0.029*).

   Table (6): Represents that there was a strong positive statistically significant correlation between total knowledge and total safety practices of studied nurses post self-learning module implementation with (p-value = 0.000).

Table (1): Frequency distribution of the studied nurses according to their demographic characteristics (n=60).

Items		N	%
Age	20 < 30	29	48.3
	30 < 40	15	25.0
	40 < 50	10	16.7
	50 < 60	6	10.0
(Mean ± SD)	**27.9 ± 4.71**		
Gender	Male	25	41.7
	Female	35	58.3
Educational level	Nursing Diploma	30	50.0
	Technical Nursing Institute	17	28.3
	Bachelor of Nursing	10	16.7
	Postgraduate Studies	3	5.0

Years of experience at gastrointestinal endoscopy unit	1 < 10	32	53.3
	10 < 20	13	21.7
	20 ≤ 30	15	25.0

Table (2): Comparison between mean scores of the studied nurses' knowledge regarding the care of patients undergoing upper gastrointestinal endoscopy pre & post self-learning module implementation (n=60).

Knowledge items	No of items	Pre self-learning module Mean ±SD	Post self-learning module Mean ± SD	T-test	P-value
Anatomy and physiology of gastrointestinal system	4	1.73 ± 0.989	3.45 ±.982	10.63	0.000**
Definition &purpose of upper gastrointestinal endoscopy	6	2.55 ± 1.466	5.20 ±1.147	12.32	0.000**
Indications and contraindications of upper gastrointestinal endoscopy	5	2.43 ±1.294	4.33 ± 1.144	8.95	0.000**
Complications of upper gastrointestinal endoscopy	4	1.63 ± 0.843	3.02 ± 1.186	7.77	0.000**
Nursing care for patient undergoing upper GI endoscopy	11	6.87 ±2.340	8.87 ± 2.354	6.13	0.000**
Total knowledge score	30	15.35 ± 5.355	24.97 ± 5.09	12.46	0.000**

* Statistically significant difference (p≤0.05), **Highly statistically significant difference (p≤0.001).
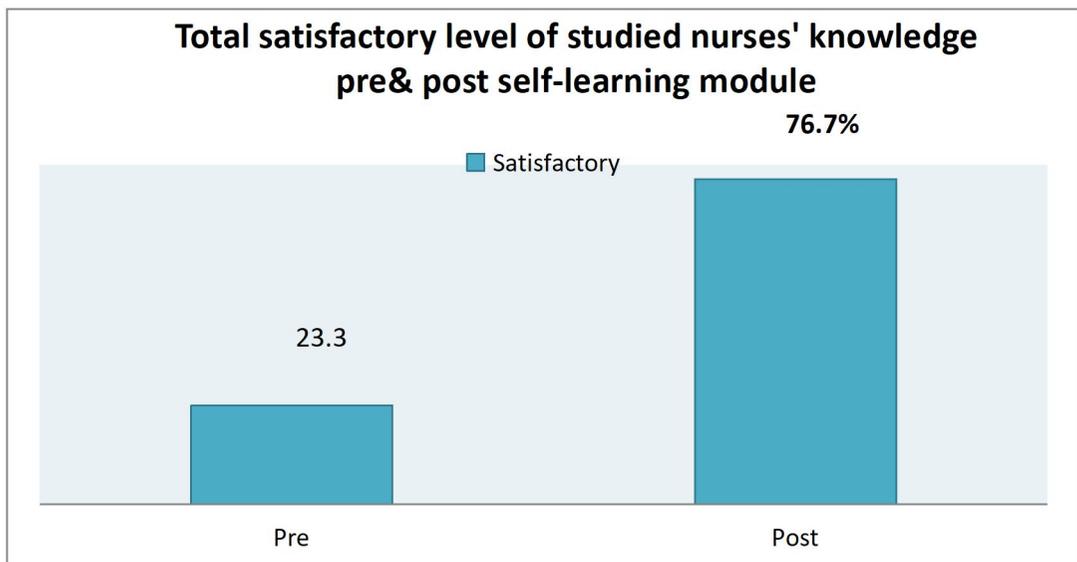

Figure (1): Comparison between total satisfactory level of studied nurses' knowledge pre & post self-learning module (n=60).

Table (3): Comparison between mean scores of the studied nurses' safety practices regarding the care of patients undergoing upper gastrointestinal endoscopy pre & post self-learning module implementation (n=60).

Safety nursing practices	No of items	Pre self-learning module	Post self-learning module	T-test	P-value
		Mean ±SD	Mean ± SD		
Safety nursing practices before endoscopy procedure	23	16.55 ± 8.142	19.4 ± 1.147	6.17	0.000**
Safety nursing practices during endoscopy procedure	38	27.88 ± 10.989	32.21 ± 0.982	7.81	0.000**
Safety nursing practices after endoscopy procedure	30	21.16 ± 11.38	24.18 ± 1.144	8.03	0.000**
Total safety nursing practices score	91	65.6 ± 15.01	75.8 ± 13.19	14.73	0.000**

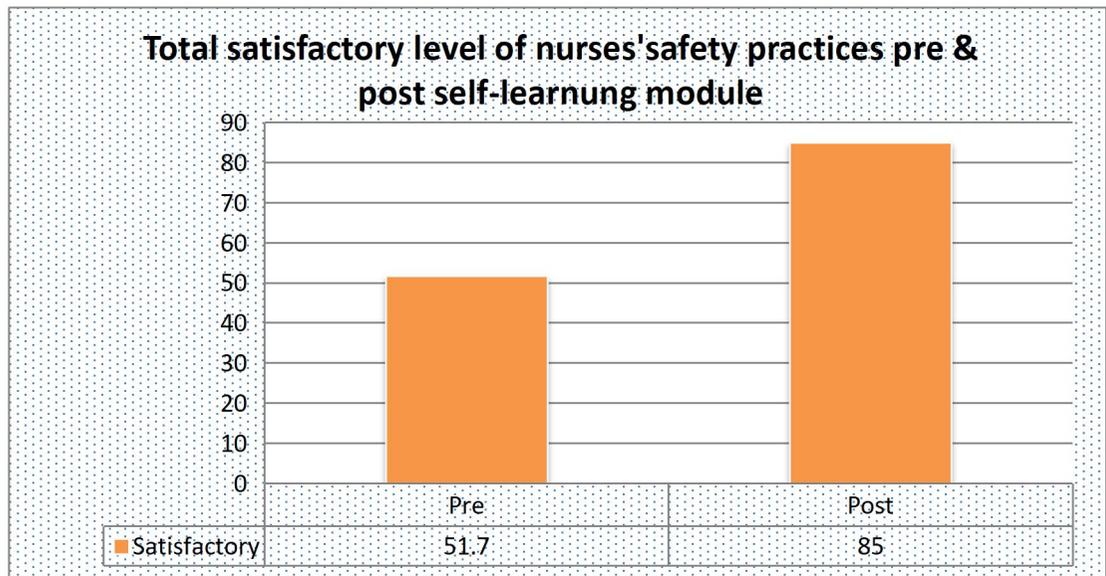****Highly statistically significant difference (p≤0.001).**

Figure (2): Comparison between total satisfactory level of nurses' safety practices pre and post self-learning module (n=60)

Table (4): Relation between total satisfactory knowledge level of the studied nurses and demographic characteristics post self-learning module implementation (n=60).

Nurses' Characteristics		Total knowledge		Chi square	P value
		Unsatisfactory	Satisfactory		
Age (in years)	20 < 30	13	16	0.021	0.88
	30 < 40	8	7		
	40 < 50	5	5		
	50 < 60	4	2		
Gender	Male	12	13	1.54	0.21
	Female	17	18		

Educational level	Nursing Diploma	10	20	20.73	0.000**
	Nursing Institute	7	10		
	Bachelor of Nursing	2	8		
	Postgraduate Studies	0	3		
Years of experience at gastrointestinal endoscopy unit	1 < 10	15	17	1.87	0.17
	10 < 20	7	6		
	20 ≤ 30	8	7		

**Highly statistically significant difference (p≤0.001).   Statistical insignificant difference, P >0.05

Table (5): Relation between total satisfactory safety practices level of the studied nurses and their demographic characteristics post self-learning module implementation (n=60).

Nurses' Characteristics		Total safety practices		Chi square	P value
		Incompetent	Competent		
Age (in years)	20 < 30	14	15	20.8	1.45
	30 < 40	6	9		
	40 < 50	6	4		
	50 < 60	3	3		
Gender	Male	13	12	17.6	0.234
	Female	17	18		
Educational level	Nursing Diploma	13	17	4.26	0.078
	Nursing Institute	8	9		
	Bachelor of Nursing	6	4		
	Postgraduate Studies	1	2		
Years of experience at gastrointestinal endoscopy unit	1 < 10	18	14	5.176	0.029*
	10 < 20	3	10		
	20 ≤ 30	1	14		

* Statistically significant difference (p≤0.05), Statistical insignificant difference, P >0.05

Table (6): Correlation between total knowledge of the studied nurses and total safety practices post self-learning module implementation (n=60).

Items	Total knowledge	
	Correlation Coefficient (r)	P value
Total safety practices	0.761	0.000**

**Highly statistically significant difference (p≤0.001).

Discussion

The growth of GI endoscopy as a specialized activity within health care has

increased the need for specialization in both facility design and management skills. Upper GI endoscopy procedures are carried out in a specifically designed and dedicated endoscopy suite, where full monitoring throughout each procedure is done. Patients are assessed before, during and after each endoscopic procedure, by specialized and certified nurses**' (Metwally, et al.,2016).**

The results of the present study clarified that near than half of studied nurses were ranged between 20 years to 30 years old with a mean age of 27.9 ± 4.71, more than half were female. As regarding educational level half of studied nurses graduated from nursing diploma. According to nurses years of experience in the gastrointestinal endoscopy unit, slightly more than half of studied nurses had experience from one to ten years. This result was in the same line **Yu & Sook, (2018)** in their study titled "Needs assessment survey for simulation-based training for gastrointestinal endoscopy nurses " who revealed that all of the subjects included in the study were female and their mean age was 35.0 ± 6.40 years (range: 22–50 years). The majority of participants were staff nurses, and more than half had 1-5 years of experience in an endoscopy unit. Two thirds of nurses had baccalaureate degrees.

Additionally ; the present study finding was supported by the study carried out by **Amer, Taha, and Zaton, (2015)** entitled "Nurses Knowledge and Practice Regarding Gastrointestinal Endoscopy and Suggested Nursing Guidelines " and reported that all the nurses included in the study were females and more than two thirds of their age ranged from 26-35 years ,three quarter had diploma degrees and more than half of nurses had experience of working in gastrointestinal endoscopy unit less than 8 years.

Similarly, this result was in agreement as regarding to age with **Moqbel et al.,2015** who studied "Effectiveness of Planned Health Education Program on Nurses' Knowledge and Practice for Preventing Infection in Gastrointestinal Endoscopy Units" and reported that two thirds of nurses age were less than 30 years old with mean age 30.1 ± 4.7 years, while this finding was inconsistent with

Abd-Elhamid et al.,(2016) whose study entitled "Impact of Training Education Program on Improving of Nurses Performance Regarding Infection Control in Endoscopy Unit" and found that that more than two third of nurses were in the age group of more than 40 years with mean age 42.2 ± 8.4 years. According to researchers' opinion differences in results between studies could be due to differences of tools used for data collection and sitting at which the study was conducted.

Concerning gender, the present study results revealed that more than half of studied nurses were female, this results were congruent with **Mohamed et al., (2018)** whose study about "Assessment of Nurses' Knowledge and Practice Regarding the Care of Patients Undergoing Gastrointestinal Endoscopy" and stated that the majority of the nurses were females.

As regarding educational level, half of studied nurses had graduated from nursing diploma. This result was in agreement with **El-Maghawry and El-Hawy (2019)** whose study entitled "Effect Of Training Educational Program on Nurses' Performance as Regarding Infection Control Procedures and Endoscopies Reprocessing Techniques in GIT Endoscopy Unit " and stated that the majority of the sample had completed their secondary nursing school education while only ten percent of them had higher education in Nursing.

In relation to years of experience, more than half of studied nurses had experience from one year to less than ten years . The study findings were congruent with **Amer et al., (2018)** who studied "Nurses Intervention Regarding Caring for Patients with Esophageal Varies During Endoscopy at Zagazig University Hospital" and stated that more than half of the study nurses had less than 10 years of experience in endoscopy unit with the mean ±SD of 7.6±5.7years.

The present study results displayed that there was noticeable progress of total satisfactory level of knowledge among studied nurses between pre and post self-learning module implementation with a statistical significant differences in total knowledge between pre and post implementation. These results supported the research hypothesis **(H1)**

which stated that studied nurses' knowledge concerning care of patients undergoing upper gastrointestinal endoscopy will be improved after implementing the self-learning module. According to researchers' point of view this could be due to majority of the studied nurses were diploma and lack of scientific preparation during undergraduate related to endoscopic procedure and its safety measure , also ;lack of in-service education program regarding to this specialized area of practice. Also the improvement of knowledge could be as a result of nurses' orientation about the domains of module and the acquisition of knowledge using self-learning strategy as well as using soft and hard copy of colored booklet that contained understandable, and reliable medical information which was evident in the post-test.

These results were in accordance with **Sajjad , Salman and Hassan (2017)** who studied **"**Effectiveness of an Instructional Program on Nurses' Knowledge concerning Preparation of Patients for Gastro-colonoscopy in AL Hussein Teaching Hospital at Al-Nasiriyah City" and stated that the nurses knowledge which exposed to instructional program were improved at post test for all domains with a statistical significant differences. Furthermore, these results were consistent with **Mahdy et al.,(2019)** who studied "Offering a Holistic Package of Quality Nursing Care for Nurses Caring Patients Undergoing Gastrointestinal Endoscopy, to Verify Patient's Safety" and reported that there were significant differences between nurse's knowledge score pre & immediately post, and one month of holistic package implementation and near half of nurses had poor level of knowledge pre- holistic package implementation.

The present study results demonstrated a radical satisfactory improvement in the studied nurses' total score of safety practices post implementing self-learning module with a highly statistically significant difference of total nurses' safety practices pre and post implementation of self-learning module. The results supported the research hypothesis **(H2)** which stated that studied nurses' safety practices concerning care of patients undergoing upper gastrointestinal endoscopy will be improved after implementing the self-

learning module.

This finding was in agreement with **Amer et al.,(2018)** who revealed that there was a high significant improvement in the practices of nurses. As well as, these results agreed with **Baumgardner, (2017),** who studied "Assessment of quality indicators among nurse practitioners performing upper endoscopy" and found that all studied subjects had satisfactory practice post-surgical endoscopic procedure. Additionally,These findings agreed with **Jasinki, (2019),** who study "The Roles and Responsibilities of Nurses in the Endoscopy Unit" and reported that continuing training should result in practice change to be effective. The researchers considered that self-learning module provided the necessary skills that enable the nurses to apply safety practices for patients pre , post and after upper gastrointestinal endoscopy.

By studying the relation between total nurses' knowledge and their demographic characteristics, the result of the current study revealed that there was highly statistically significant relation between educational level and the total knowledge level. This finding was in the same line with **AboBakr et al.,(2019)** who studied "Effect of Designed Guidelines on Nurses' Performance and Patients' outcome Regarding Upper Gastrointestinal Endoscopy " and revealed that there was statistically significant relation between total nurses' knowledge and level of education pre and post implementation of the designed guidelines. This is mean that nurses' knowledge improved with high level of education. Also; this finding is in agreement with **Othman, (2018) ,** who studied "Nursing guidelines for hematemesis patients undergoing upper gastrointestinal endoscopy" and mentioned that regarding to relation between socio demographic data and total knowledge of nurses, there is a significant difference between educational level and the total level of knowledge statistically.

By studying the relation between total nurses' practice and their demographic characteristics, it was found that, there was statistically significant relation between total nurses' practice and years of experience at gastrointestinal endoscopy unit. These results

were in accordance with **Mohamed, et al., (2018)** who found that, there was statistically significant relation between nurses' performance and their demographic characteristics regards experience. According to the opinion of researcher , years of nurses' experiences could improve their level of skills.

Finally, the present study confirmed that there was a statistically significant strong direct correlation between total knowledge and total safety practices of studied nurses which supported research hypothesis (H3) which stated that there will be a positive correlation between nurses' knowledge and practice post implementing self-learning module. These findings were in agreement with a recent study conducted by **AboBakr et al.,(2019)** who stated that there was positive correlation between total nurses' level of knowledge and total nurses' level of practice pre and post implementation of the designed guidelines. In addition these findings supported by **El-Maghawry & El-Hawy (2019)** who clarified that, there was positive correlation between nurses' knowledge and practice regarding patients care and infection control measures in endoscopy unit. In the same line, **Khalifa, et al., (2015)** in a study of "Effect of Designed Implemented Nurses' Educational Program on Minimizing Incidence of Complications for Patients with Upper Gastrointestinal Bleeding" points up that there was positive correlation between knowledge score and practice score. On the other hand, **Osman, et al., (2014)** in a study about "Establishing Nursing Guideline For Nurses Caring With Haematemsis Patients Undergoing Upper Gastrointestinal Endoscopy" revealed that was no significant correlation between total practice level and total knowledge level. Also , **Najeeb & Taneepanichsakul, (2010)** who conducted a study regarding infection control among doctors and nurses, reported a weak, negative relationship between knowledge and practice.

Conclusion

Based on results of the present study, it could be concluded that there was a positive effect of self-learning module on studied nurses' knowledge and safety practices concerning care of patients undergoing upper gastrointestinal endoscopy as there were

highly statistically significant differences in total nurses mean score of knowledge and practices between pre and post implementation of self-learning module, a positive correlation between total scores of knowledge and total scores of safety practices were be found. So, the research hypotheses were supported.

Recommendations

In line with the findings of the study, the following recommendations can be suggested:

- Periodic in-service training to maintain and update level of knowledge and practices of nurses working at endoscopy unit.

- Developing a manual of safety measures for the GI endoscopy nursing practice both in Arabic and English languages.

- Emphasizing the concept of patients safety in constructing the training programs and the integration between practice and all safety domains should always be considered**.**

Recommendations for furthers studies

- Study the effect of implementing educational training program for nurses on the clinical outcomes of patients undergoing gastrointestinal endoscopy.

- Determine the barriers that are hindering the nurses' application of safety measures at the GI endoscopy unit.

- Replication of the study on a larger sample in different hospitals and multiple geographical areas, to confirm the result of the study.

References

Abd-Elhamid, A., El-khashab M. and Taha, N. (2016): Impact of Training Education Program on Improving of Nurses Performance Regarding Infection Control in Endoscopy Unit. , Afro-Egypt J Infect Endem Dis; 6(1): 16-28.

AboBakr,E., Abd Allah,K. Mohamed, H. and Ameen, D. (2019): Effect of Designed Guidelines on Nurses' Performance and Patients' outcome

Regarding Upper Gastrointestinal Endoscopy, International Journal of Novel Research in Healthcare and Nursing Vol. 6, Issue 3, Pp: (420-432).

Aitken M., and Gorokhovich L., (2012): Advancing the Responsible Use of Medicines: Applying Levers for Change. Parsippany (NJ): IMS Institute for Healthcare Informatics; (https://ssrn.com/abstract=2222541, accessed 23 October 2018.

Amer, W. , Zaton, H., Taha, N. and ElKhashab, M. (2018): Nurses Intervention Regarding Caring for Patients with Esophageal Varies During Endoscopy at Zagazig University Hospital, International Journal of Pharmaceutical Research & Allied Sciences, 7(4):18-29.

Amer, W., Taha, N. and Zaton, H. (2015): Nurses Knowledge and Practice Regarding Gastrointestinal Endoscopy and Suggested Nursing Guidelines , Afro-Egypt J Infect Endem Dis 2015; 5(2): 115-130.

Baumgardner J., Sewell J., and Day, L. (2017): Assessment of quality indicators among nurse practitioners performing upper endoscopy. Endoscopy international open J, 5(9), Pp: 818-824.

Decristoforo, P., Kaltseis, J., Fritz, A., Edlinger, M., Posch, W., Wilflingseder, D., & Orth-Höller, D. (2018). High-quality endoscope reprocessing decreases endoscope contamination. Clinical Microbiology , Elsevier Ltd. ,24 (2018).

Dunkley, I., Griffiths H. ,Follows, R., Ball, A., Collins,M., Dodds, Ph., Gardner, R., Jackson, V., Rodgers, B ., Taggart, N., Tham, T., Wilkin, V. and Veitch, A. (2019): UK consensus on non-medical staffing required to deliver safe, quality-assured care for adult patients undergoing gastrointestinal endoscopy, Frontline Gastroenterology ;10:24–34. Avilable at :http://dx.doi.org/10.1136/ flgastro-2017-100950.

Early, D., Lightdale, J. and Vargo J. (2018): Guidelines for sedation and anesthesia in GI endoscopy.Gastrointest. Endosc;87: 327–37.

El-Maghawry, H. and El-Hawy, L. (2019): Effect of Training Educational Program on Nurses' Performance as Regarding Infection Control Procedures and Endoscopies Reprocessing Techniques in GIT Endoscopy Unit, Egyptian Journal of Occupational Medicine; 43 (1) : 57-73.

Hinkle, J. and Cheever, K.(2017): Textbook of Medical-Surgical Nursing, 14th ed., Philadelphia: wolters kluwer health, p.p: 1389-400.

Hiremath, P., Mohite, V. and Pawar, S.(2016): A study to assess the knowledge, attitude and pre procedure anxiety level of patient undergoing upper gastrointestinal endoscopy, The American Journal of Gastroenterology. ; 5(6): 242-9.

Jasinki J., (2019): The Roles and Responsibilities of Nurses in the Endoscopy Unit, Endoscopy Nurse Interview Questions , 16th ,1-20.

Khalifa, Z. Ahmed , S., Abd El Kader, H. and khalill, F.(2015): Effect of Designed Implemented Nurses' Educational Program on Minimizing Incidence of Complications for Patients with Upper Gastrointestinal Bleeding, Egyptian Journal of Health Care, EJHC,Vol.6 No.1.

Levett-Jones, T. (2015): Self–directed learning : Implications and limitations for undergraduate nursing education. Nurse Education Today,25(5):363-368.

Mahdy, A., Arafat, M., Abd Elkader, H. & Mahfouz, H. (2019): Offering a Holistic Package of Quality Nursing Care for Nurses Caring Patients Undergoing Gastrointestinal Endoscopy, to Verify Patient's Safety , International Journal of Novel Research in Healthcare and Nursing Vol. 6, Issue 2, Pp: (1111-1122).

Maile, C. A. & cooper, M. S. (2018). The CIMC guide to developing modules for selfpaced learning a handbook for teachers, Oklahoma department of career and technology education, USA, p 10.

Majeski, J., Lynch, W. and Durst, G. (2019): Explanation of Endoscopy. Am J Surg.;198(5).

Metwally, H., Abou Donia, Sh. and Abdel Aziz,Th. (2016): Safety Nursing Measures for Patients Undergoing Upper Gastrointestinal Endoscopy , ASNJ .,Vol.18 No. 1.

Mohamed, L., Mohamed, L. Abo El-ata, A., Abd El-latef, E. (2018): Assessment of Nurses knowledge and Practice Regarding the Care of Patients Undergoing Gastrointestinal Endoscopy. Port Said Scientific Journal of Nursing. 5 (1), 141.

Moqbel AA, Shebl AM and Soliman HM (2015): Effectiveness of Planned Health Education Program on Nurses' Knowledge and Practice for Preventing Infection in Gastrointestinal Endoscopy Units at Major Hospitals in Yemen. IOSR Journal of Nursing and Health Science; 4(6):39-47.

Nabolsy, R. (2012): Factors Affecting Self-Care For Patents with Colon Cancer Thesis of Master Degree, Medical Surgical Nursing ,Ain Shams University ;P.55.

Najeeb, N., and Taneepanichsakul, S. (2010): Knowledge, attitude, and practice of standard and transmission-based precautions of doctors and nurses in tertiary and secondary health care settings of Maldives. Journal of Health Research. (22), 45-48.

Naqvi, I. , Talib, A. , Tabraze, M. , Siddiqui, O. , Hussaini, M. , Paryani, N. , Effendi, R. , Siddiqui, S. , Hassan, S. , Munawar, M. , Waseem, Z. , Khan, A. , Khan, Z. , Rizvi, S. , Farooqui, S. , Munaf, M. , Obaid, H. and Khan, F. (2019): Upper Gastrointestinal Endoscopic Outcomes in Patients with Gastrointestinal Symptoms: Retrospective Analysis at a Tertiary Care Hospital. *Open Journal of Gastroenterology*, **9**, 141-15.

Osman, S., Hassanin, A. , and Salama, H. (2014): Establishing Nursing Guideline For Nurses Caring With Haematemsis Patients Undergoing Upper Gastrointestinal Endoscopy Mansoura Nursing Journal (MNJ) vol.6. No.1., P.p 55-93.

Othman, S. (2018): Nursing guidelines for hematemesis patients undergoing upper gastrointestinal endoscopy (Master's Thesis). Faculty of Nursing, Mansoura University.

Park, W., Shaheen, N., and Cohen, J., (2015): Quality Indicators For GI Endoscopic Procedures, American Society for Gastrointestinal Endoscopy and American College of Gastroenterology 81:17– 30. ,Avilable at : http:// dx. doi. org/ 10. 1016/ j. gie. 2014 .07. 057.

Puttaraju, Sh. and Sreramaseshadri, R. (2019): Study of upper gastrointestinal endoscopy in patients with gastrointestinal symptoms, International Surgery Journal ,Int Surg J. 6(10):3595-3599.

Sajjad, S. Salman, S. and Hassan, H. (2017): Effectiveness of an Instructional Program on Nurses' Knowledge concerning Preparation of Patients for Gastro-colonoscopy in Al Hussein Teaching Hospital at Al- Nasiriyah City ,IOSR Journal of Nursing and Health Science Volume 6, Issue 3, PP 102-109.

Singh H., Meyer A.N., Thomas E.J., (2014): The frequency of diagnostic errors in outpatient care: estimations from three large observational studies involving US adult populations. BMJ Qual Saf. ,23(9):727-31. Available at: https://www.ncbi.nlm.nih.gov/pubmed/24742777, accessed 7 November 2018.

Smith, N. and Timby, B. (2018): Introductory medical endoscopy nursing, Caring for clients Undergoing endoscopy, 10th ed.

Philadelphia, Wolters Kluwer Health, Lippincott

Stratton, S. (2019): Quasi-Experimental Design (Pre-Test and Post-Test Studies) in Prehospital and Disaster Research, Vol. 34, No. 6. Published online by Cambridge University Press.

Taylor, C., Lynn, P., & Bartlett, J. (2018): Fundamentals of nursing: The art and science of person-centered care. ,8th ed., Lippincott Williams & Wilkins p.p 1310.

Thandassery, R., Sharma, M., John, A., Al-Ejji, K., Wani, H., and Sultan, K. (2015): Clinical application of AIMS65 scores to predict outcomes in patients with upper gastrointestinal hemorrhage. Clin Endosc Journal. 120 , 48, 5, pp380-384. Williams & Wilkins, Pp (583- 585).

Yu, S. and Sook, Y.(2018): Needs assessment survey for simulation-based training for gastrointestinal endoscopy nurses, Nurs Health Sci.;20:247–254.