

Offering a Holistic Package of Quality Nursing Care for Nurses Caring Patients Undergoing Gastrointestinal Endoscopy, to Verify Patient's Safety

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Abstract: The study was aimed to assess the effect of offering a holistic package of quality nursing care for nurses caring patients undergoing gastrointestinal (GI) endoscopy, to verify patient's safety. **Research Design:** Quasi experimental design was used to meet the aims of this study. **Setting:** study was conducted in the Gastroenterology Endoscopic units at Benha University Hospital. **Sample:** a convenience sample of all nurses (30) who are working in gastroenterology Endoscopic units at Benha University Hospital. **Tools:** Three tools were utilized. **1st tool:** Nurses' Knowledge Questionnaire, it includes two parts: Part 1: demographic data for nurses, Part 2: Nurse's knowledge test: to assess nurse's knowledge about care of patients undergoing upper GI endoscopy, **2nd tool:** Nurses' Observational Checklist to assess the nurses' practices for caring of patient undergoing upper GI endoscopy, **3rd tool:** The designed holistic package of quality nursing care for nurses caring patients undergoing GI endoscopy. **The main results:** the study demonstrated that there was highly statistically improvement in knowledge and practice of nurses caring patients undergoing GI endoscopy, also there was positive correlation between nurses' knowledge and practice scores, in addition to there was significant positive correlation between knowledge and practice scores with years of experiences. **Conclusion:** The present findings concluded that there were very highly statistical significant improvement in all items that related to infection control and patients' safety measures throughout study phases. **Recommendations:** The holistic package of quality nursing care should be applied & evaluated periodically on endoscopic units. Further researchers; conducting educational training programs about enhancing safety measures, infection control, and patients' right for patient undergoing GI endoscopy.

Keywords: A holistic package of quality nursing care, gastrointestinal (GI) endoscopy, patients' rights, and safety measures.

I. INTRODUCTION

Performance of Gastrointestinal (GI) endoscopy for many indications as direct visualization of GI tract, investigate symptoms, diagnosis, and treatment. In the past, endoscopists have been limited to GI tract, advent of enter of the endoscopy. However, with the enter scope at hand. (Hyun, 2013). Success and efficacy of GI endoscopy depend on following; infection control & safety measures so, it is very importance to assess endoscopic units and all staff working in this unites. Evaluation of these is very important. Infections due to GI endoscopy have been due to infractions in established protocols for handling endoscopes and reprocessing. So, it is very important to the proper training of staff and

having policies and processes in place to Be sure to keep enough training, nurses are responsible to taking decisions that are based upon the educational planning and clinical efficiency in nursing, also reasonable for skill and safety. Nursing practice should be consistent with Nursing Laws, planning standards of practice, and evidence based. (**Kentucky Board OF Nursing, 2019**).

It is very important to consider many factors in order to perform safe endoscopy. Each procedure of endoscopy has preparation and precautions, it can be divided into three procedural steps: per-procedure, Pre-procedural preparation are essential for safety as: patient identification, procedure type, indication, patient Informed consent, taking History and examination, sedation planning, prophylaxis as antibiotic Antithrombotic, monitoring devices, Preparation for emergency, Time-out Also sure that patient fasting 6 hours' at least, remove of the dentures (**Lee and Lee, 2011; Peter et al., 2008**).

Post-procedural nurse assessment mouth and throat and examine abdominal for pain, Hematemesis and melena, check level of consciousness, gag reflex, vital signs, general monitoring the patient for 1-2 hours until relive effects of the sedatives, check early signs of risks and complications, document symptoms of dysphagia, painful throat or chest, fever and chills (**Roberta et al., 2007**).

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, recommendations by these experts with experience in the safe delivery of care in endoscopic procedure (**American Society of Anesthesiologists, 2013**). A lot of efforts to defining what constitute high-quality endoscopy. These efforts ensure that developing, refining, and implementing procedure-associated quality indicators. **Alder et al., (2015)**, have been helpful in promoting best practices among endoscopists and providing evidence-based care for our patients **Park et al., (2015)**. At the same time, the American Society for Gastrointestinal Endoscopy (ASGE) has generated programming to assist physicians and allied healthcare professionals in understanding how to translate quality concepts into practice. With this work, we now have a stronger sense of how to measure quality at the patient and procedural level (**Enestvedt et al., 2013**).

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, unsafe transfusion practices, and sepsis (**Aitken & Gorokhovich, 2012; WHO, 2009 & 2011**).

According to **WHO, (2018)**, 1 in 10 patients harmed in hospital care, 14 out of every 100 patients affected by hospital acquired infection, 2% patients subject to surgical complications for the 234 million surgical operations performed every year, 6.3 events per patient days in the US annually due to medical devices and 20-40% health spending wasted due to poor quality of care and safety failures. Patient Safety Goals (NPSGs), which focused on solving healthcare safety problems these safety issues included several nursing responsibilities, such as safe medication administration, communication, clinical alarm safety, healthcare-associated infections, and patient identification (**WHO, 2018**).

Registered 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**).

The unit managers in endoscopy units have the responsibilities to ensure their staff are competent, deliver quality care that evidenced based, supporting staff in their updating education and training to able to deliver the required care in optimum level. (**Johnson, 2010; and Echavarría, 2015**). Manage patient care to ensure the highest professional standards using an

evidence based, care planning approach, provide a high level of professional and clinical leadership, be responsible for the co-ordination, assessment, planning, delivery and review of service user care by all staff in endoscopy department, participate in teams/ meetings/ committees as appropriate, communicating and working in co-operation with other team members, plan discharge or transition of the service user between services as appropriate, maintain nursing records in accordance with local service and professional standards, adhere to and contribute to the development and maintenance of nursing standards, protocols and guidelines consistent with the highest standards of patient care, evaluate and manage the implementation of best practice policy and procedures within the endoscopy department e.g. admission and discharge procedures and ensure that effective safety procedures are developed and managed to comply with statutory obligations, in conjunction with relevant staff e.g. health and safety procedures, emergency procedures, assists with developing and implementing performance initiatives to ensure optimal patient safety and outcomes and customer satisfaction (Wellington, 2011; Kumar, Mital, and Pennathur, 2014). In addition to the nurse manager are responsible for planning adequate number and mix of staff needed in endoscopy units and provide needed equipment's to deliver care. To ensure that staff have confidence and satisfaction in providing patients care, nurse managers must assess staff training in regular basis. Also as mentioned by (Royal College of Physicians, 2017; Gov and Managing Medical Devices, 2017), all staff should be having opportunities for education and training and supported in their workplaces. Endoscopies nurse should offer care to patients as a holistic package during endoscopy, to meet patients' rights, safety, physiological, psychological and sociological needs. In addition nurse should have the performance to assess these needs through endoscopic pre-procedure, appropriate care ensures safe delivery of endoscopic equipment (Pauline-Matthews, 2001; and Muscarella, 2014). Endoscopic unit supervisor role is to provide excellent nursing care, and to actively participate in and contribute to the management of the Endoscopy unit. Participate in the maintenance of endoscopes and other specialized equipment used in endoscopic and non-endoscopic procedures and provide technical assistance during such procedures (Premier Medical Group, 2013).

I.1. Significance of the study

Many studies revealed that is very important to ensure safety and quality of care for endoscopic procedures. And illustrated that the implementing of the designed nursing protocol on nurse's performance and present holistic package of quality nursing care regarding patients under upper GI endoscopy, in addition to the researchers' observation in the hospital setting about the endoscopy problem and it effect on patients' safety, so the researchers found that is vital researchable problem and can implement holistic package of quality nursing care for nurses caring patients under GI endoscopy.

I.2. Aim of the study

The present study was aimed to assess effect of offering a holistic package of quality nursing care on nurses caring of patients undergoing gastrointestinal endoscopy, to verify patient's safety through:-

1. Assessing Nurses' knowledge & practice, and safety measures regarding endoscopic procedure
2. Implementing the designed a holistic package of quality nursing care regarding endoscopic procedure
3. Assessing the effect of holistic package of quality nursing care regarding endoscopic procedure on nurses.
4. Assessing the relation among nurses' knowledge & Practice and safety measures regarding endoscopic procedure

I.3. The research hypothesis

- 1- The nurses who receive a holistic package of quality nursing care for endoscopic procedure will be improved in their knowledge & practice and safety measures after implementing it.
- 2- There will be a positive correlation between knowledge and practice among nurses receive a holistic package of quality nursing care for endoscopic procedure

II. SUBJECTS AND METHODS

Study design: The researchers were used quasi experimental design to achieve the aims of this study.

Subject: A convenience sample of all nurses (30) who are working in GI endoscopic units at Benha University Hospital.

Setting: The study was performed in the Gastroenterology Endoscopic units at Benha University Hospital.

Tools of Data Collection

Three tools were utilized for data collection:-

The first tool: Nurses' Knowledge Questionnaire: It was a structured questionnaire developed by the researchers through review of literature (Lichtenstein et al., 2008; Calderwood et al., 2014; Muscarella, 2014; Rex et al., 2015; Wani et al., 2015; and WHO, 2018), it includes two parts: **Part 1:** Socio-demographic data for nurses: to assess the demographic data of the nurses such as (age, sex, marital status, qualification, years of experience and previous training, ... etc.). **Part 2:** Nurse's knowledge test: to assess nurse's knowledge about care of patients undergoing upper GI endoscopy. It consisted of different items such as, knowledge about quality of nursing care for patient under GI endoscopy, infection control strategies, precaution related to biopsy sample handling, patient' safety measures, patient discharge instructions, ... etc.

Scoring system: Each item was scored as "1" for correct answer, and "zero" for incorrect answer. The cut point was done at 60%. Nurses who obtained less than 60% were considered unsatisfactory level, while nurse who obtained \geq (60%) were considered satisfactory level.

The second tool: Nurses' Observational Checklist: it was an observational checklist developed by the researchers through review of recent related literature (Lichtenstein et al., 2008; WHO, 2008; Premier Medical Group, 2013; Calderwood et al., 2014; Rizk et al., 2015; Wani et al., 2015), to assess the nurses' role and practices for caring of patient undergoing upper GI endoscopy.

Scoring system: The items were scored as "0" not done, "1" done incompletely, and "2" done completely. The cut point was done at 60%. Nurses who obtained scores that less than 60% were considered inadequate level of practice, while nurse who obtained scores \geq (60%) were considered adequate level of practice.

The third tool: The designed holistic package of quality nursing care for patient undergoing upper GI endoscopy: it was developed by the researchers through review of relevant recent literature based on the nurses' needs that can help nurses in provision of a safe quality care for assigned patients.

Preparatory phase: starting by preparing of tools for data collections and after that designing a holistic package of quality nursing care for patient undergoing upper GI endoscopy by exploring all related literatures and pre assessment of nurses' knowledge & practice, and safety measures and then the final form of a holistic package of quality nursing care for patient undergoing upper GI endoscopy which examined by 5 a panel of experts.

- **A pilot study:** Carried out in October (2017) on 10 % from the studied subjects (3 nurses) who working with patients undergoing upper GI endoscopy to assess the clarity and applicability of the study tools. They were included in the final study sample.

Ethical considerations:

Obtain oral Informed consent from the nurses whom participate in the study. The researchers ensure that the participation in the study is voluntary and confidentiality and anonymity of the subjects will be assured through coding all of data and they reassured that all information gathered would be confidential and used only for the purpose of the study. Withdraw from the study at any time without any cost.

Filed work:

Data were collected in the following sequence:

- An official permission to proceed with the proposed study was granted from the head of the Endoscopic gastroenterology units. The purpose of the study was explained to the nurses prior to answering the tools. The tools of the study were translated to Arabic language for better understanding & reviewed by a jury of five expertise from medical surgical & administration nursing departments at faculty of nursing before the researchers distributed it to nurses. Data were collected in Endoscopic Gastroenterology unit at Benha University Hospital during the period from October 2017 to December 2017. The study was carried out at morning and afternoon shifts. Tools filled through interviewing with nurses in free time.

- To test knowledge, each nurse was interviewed individually before applying the designed teaching a holistic package of quality nursing care for patient undergoing upper GI endoscopy & pre-test assessment sheet were distributed by the researchers & filled by the nurses in order to identify the baseline nurse's knowledge & practice and safety measures of patients undergoing upper GI endoscopy using tool 1. This tool took about 20 to 25 minutes. Also, to test the nurse's practice pre-test, each nurse was observed in order to detect their practice to determine their needs regarding Knowledge & practice, and safety measures of patients undergoing upper GI endoscopy using the second tool. This tool took different time according to time needed for each procedure during shift.
- The educational designed teaching a holistic package of quality nursing care for patient undergoing upper GI endoscopy was developed based on the results of the pre-test data. It was carried out through 7 sessions and the allowed time was (30-35) minutes for each session. Number of nurses in each session ranged between (4-5) nurses. Each nurse takes a copy of the booklet that included all contents. After that, immediately post assessment at last session, one & two months post holistic package implementation, the researchers gave the post-test to detect the improvement of nurse's knowledge through the assessment sheet while the nurse's practice and safety measures was tested through the observational checklist.
- **Designed a holistic package of quality nursing care for patient undergoing upper GI endoscopy:** It was developed by the researchers from literature reviews, researchers' experience and opinions of the medical surgical and administration nursing expertise based on assessment needs to verify safety measures for patients. The teaching booklet was revised and modified based on the expertise comments, it was written in Arabic using simple language with illustrations and it was concerning with three main items: knowledge about endoscopy, nursing care during endoscopy, and safety measures for patient undergoing GI endoscopy.
- The data collected through using the previous mentioned tools pre and immediately after implementing the holistic package of quality nursing care for patient undergoing upper GI endoscopy, and also after one and two months.

Statistical design: Descriptive statistics were calculated (e.g., frequency, percentage, mean and standard deviation). Testing hypotheses were applied to check the significance of differences between achieved levels (scores or grades) before and after the application of the holistic package. Relations; A probability level of > 0.05 was adopted as a level of significance for testing the research hypothesis.

III. RESULTS

Figure (1): showed frequency distribution of the studied nurses according to their demographic variables, regarding to age, a half of nurses (50%) were in between (30-39) years old. Regarding an educational level the majority of the nurses (96.7%) had diploma degree, all of them (100%) were married. more than half (60%) of the nurses had from (10-20) years of work experience. The results were very highly statistical significant. Figure (2) demonstrated that near two thirds of studied nurses were unsatisfactory level of total knowledge score in pre intervention, while it improved and increased at immediately post, one & two months after implementation of the holistic package of quality nursing care. Table (1): demonstrated that there was highly statistically significant improvement in all activities that related to nursing practice for patients undergoing GI endoscopy. Table (2): this table exhibits that there were statistical significant improvement in total knowledge and practice; near two thirds of nurses (63.3%) were unsatisfactory knowledge but it improved and increased to (83.3% & 80%) and became satisfactory in immediately post, one, & two months respectively, also all of (100%) nurses' practice were inadequate in pre-intervention, while their practice was improved and increased to (86.7%) in immediately post, while it slightly decreased to (76.7%, and 70%) after implementation of one, and two months respectively but still more than pre-intervention. Table (3): pointed up that; there was positive correlation between knowledge score and practice score. Table (4): illustrated that; there was very high statistical significant positive correlation between knowledge scores with age and years of experiences, also there was statistical significant positive correlation between practice scores with education and years of experiences.

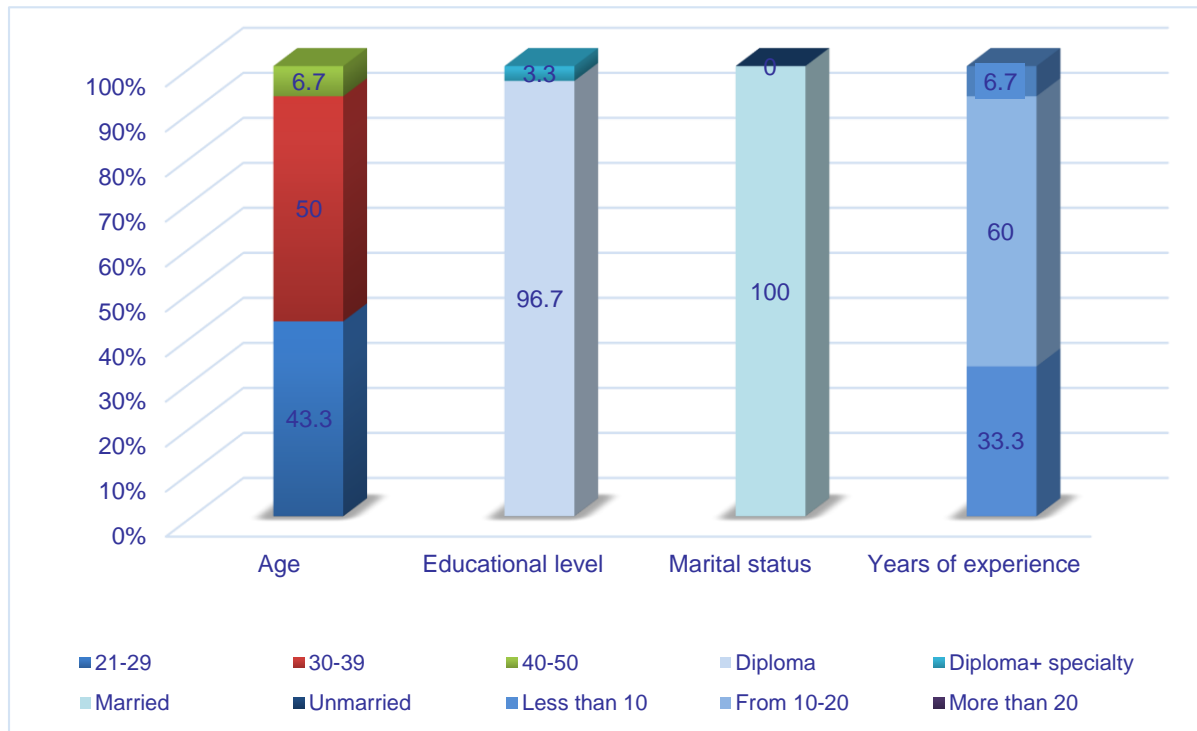


Figure (1): Frequency distribution of the studied nurses according to their demographic variables (N = 30).

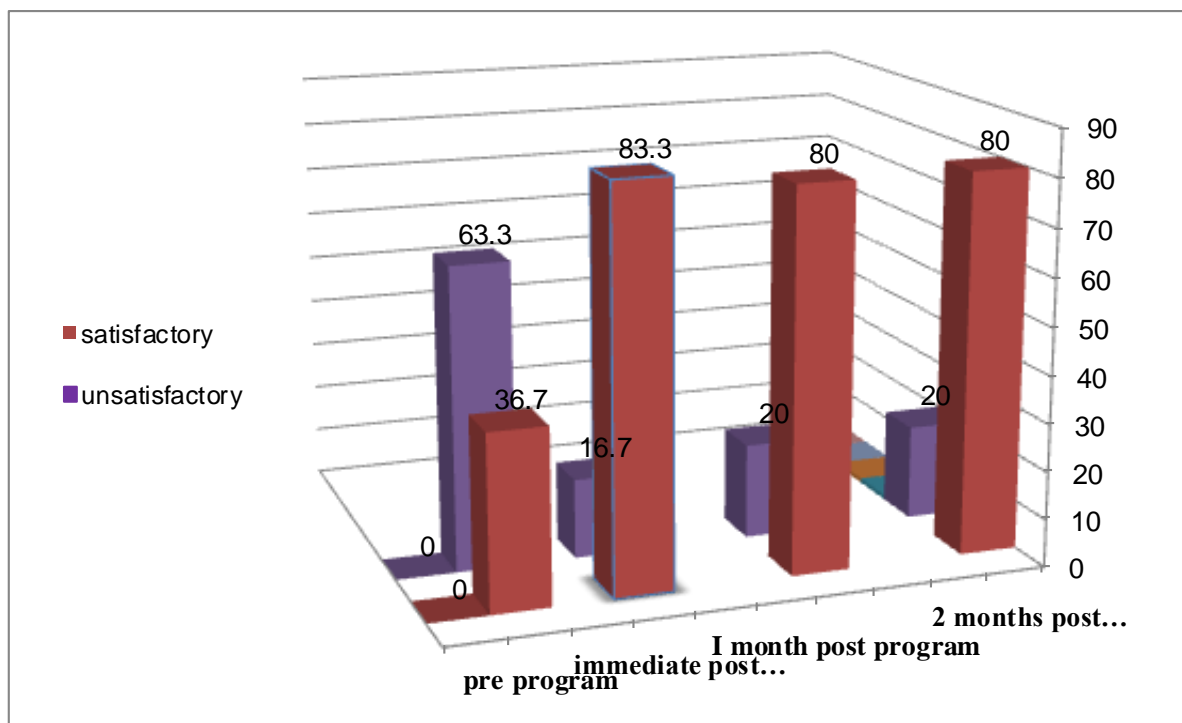


Figure (2): Total Level of nurses' knowledge throughout study phases. (N=30)

TABLE (I): Percentage distribution of nurses' practice throughout study phases. (N=30)

Standardized endoscopic Practice		Study phases		Pre		Immediately post		1 Month post		2 Months post		X2	P-value
		NO	%	NO	%	NO	%	NO	%				
Standardized endoscopic care	Activity I : infection control measures	Adequate	-	-	26	86.7	24	80.0	21	70.0	41.550	.000*	
		Inadequate	30	100	4	13.3	6	20	9	30			
	Activity II: precautions related to biopsy samples handling	Adequate	-	-	27	90.0	23	76.7	21	70.0	42.650	.000*	
		Inadequate	30	100	3	10	7	23.3	9	30			
	Activity III: safety measures	Adequate	-	-	25	83.3	22	73.3	21	70.0	31.200	.000*	
		Inadequate	30	100	5	16.6	8	26.7	9	30			
	Activity IV: universal precaution related to linens, gowns, gloves and masks disposal, cleaning spills of blood & other body fluid	Adequate	-	-	26	86.7	24	80.0	22	73.3	42.450	.000*	
		Inadequate	30	100	4	13.3	6	20	8	26.7			
	Activity V : disinfect/ sterilize the endoscope	Adequate	-	-	25	83.3	24	80.0	22	73.3	39.650	.000*	
		Inadequate	30	100	5	16.7	6	20	8	26.7			
	Activity VI : rinsing	Adequate	-	-	25	83.3	25	83.3	23	76.7	57.950	.000*	
		Inadequate	30	100	5	16.7	5	16.7	7	23.3			

Continue TABLE (I): Percentage distribution of nurses' practice throughout study phases. (N=30)

Standardized endoscopic Practice		Study phases		Pre		Immediately post		1 Month post		2 Months post		X2	P-value
		NO	%	NO	%	NO	%	NO	%				
	Activity VII : drying and alcohol flush	Adequate	-	-	25	83.3	24	80.0	22	73.3	40.550	.000*	
		Inadequate	30	100	5	16.7	6	20	8	26.7			
	Activity VIII : endoscope accessories: reusable accessories including water bottle	Adequate	-	-	26	86.7	24	80.0	23	76.7	47.450	.000*	
		Inadequate	300	100	4	13.4	6	20	7	23.3			
intervention phase e	Activity IX Endoscopic therapy & insertion of balloon tamponade	Adequate	-	-	26	86.7	24	80.0	24	80.0	51.800	.000*	
		Inadequate	30	100	4	13.4	6	20	6	20			
Standardized endoscopic care	Activity X : Storage	Adequate	-	-	26	86.7	23	76.7	21	70.0	36.200	.000*	
		Inadequate	30	100	4	13.3	7	23.3	9	30			

TABLE (II): Percentage distribution of nurses' knowledge and practice throughout study phases. (N=30)

Practice score		Knowledge score		Pre		Immediately post		1 Month post		2 Months post		X2	P-value
		NO	%	NO	%	NO	%	NO	%				
Total knowledge score	Satisfactory	11	36.7	25	83.3	24	80.0	24	80.0	73.400	.000*		
	Unsatisfactory	19	63.3	5	16.7	6	20.0	6	20.0				
Total practice score	Adequate	-	-	25	83.3	24	80.0	22	73.3	40.550	.000*		
	Inadequate	30	100	5	16.6	6	20	8	26.7				

TABLE III: Correlation coefficient between the nurses' knowledge and practice total scores (N=30)

category	Knowledge score	
	r	P-value
Practice score	.237	.104

TABLE IV: Correlation coefficient among the nurses' knowledge & practice total score and their demographic variables (N=30)

Demographic variables	knowledge score		practice score	
	r	P-value	R	P-value
Age	-.742	.000*	-.132	.244
Education	.107	.286	.312	.047*
years of experience	-.774	.000*	-.330	.037*

N.B. For all statistical tests done; P value > 0.05 insignificant, P value < 0.05 significant, P value < 0.01 highly significant and P value < 0.001 very highly significant.

IV. DISCUSSION

Endoscopy is an effective and safe not only for diagnostic but also for therapeutic approaches, quality of patient life not significantly affected by endoscopy on long-term. (Link et al., 2010).

Regarding to studied nurses according to their demographic variables: The finding of the study revealed that half of the nurses were in between [30-39] years old. Majority of them had diploma degree. All of them were married. In relation to years of experience; more than half (60%) of the nurses had from [10-20] years of work experience, which showed very highly statistical significant. This may be due to dependent in this area on old and experienced nurses because they are mature enough to tolerate the workload and responsibility of working and able to manage the requirements of nursing practice. This findings was supported by (Muscarella 2014), who stated that one third of the studied nurses were within age group of 25 ≥ 35 years old, this finding is similar to Hyun, (2013), who found that less than two third of the studied nurse were married and with diploma .This is may be due to lack of motivation in their family to complete after diploma but families encourage them to marry after diploma.

Related to effect of implemented holistic package on the nurses' knowledge and practice scores (assessment phase) the present study findings demonstrated that; in relation to total knowledge score the majority of the nurses were good immediately post implemented of holistic package and the score slightly decreased after one & two months after implementation of the holistic package. Also there were significant differences between nurse's knowledge score pre & immediately post, one month and two months of holistic package implementation and near half of nurses had poor level of knowledge pre- holistic package implementation This may be due to majority of the studied nurses' were diploma and lack of scientific preparation related to endoscopic procedure and its safety measure and may be related to insufficient preparation during undergraduate and also lack of in-service education program regarding to this specialized area of practice. This result was in agreement with Jasinki, (2019), who reported that the nursing primary responsibilities include patient reassuring by replay inquire and concerns, also observing patient vital signs and administering medication. So that nurse's knowledge and practice should improve. Tina et al., (2001) and Abd El- All Hamid, et al., (2014), who added that nurses level of knowledge was poor regarding endoscopy procedure before implementation

teaching protocol but their knowledge level improved post teaching protocol. In the same line **Park et al., (2015)**, who assured that knowledge of nurses showed statistically significant differences between pre, immediate and post program implementation. These results disagree with **Lee & Lee, (2011)**, who showed that the majority of studied group had unsatisfactory level of knowledge about components of endoscopy concerned with the nurses' effect of implemented educational program on the nurses' practice score (Standardized endoscopic care study portrayed that; the majority of nurses were poor in infection control and safety measures, also infection control that related to; biopsy handling, cleaning spills of blood & other body fluid, universal precaution related to linens, gowns, gloves and masks disposal pre implemented of holistic package. On the other hand the majority of nurses were good for the same activities immediately, 1 month & 2months post implementation of holistic package. The results were very highly statistical significant, this could be due to that the nurses not consider with these items except with infectious patient this from their opinion. This on same context with **Ezz- El-din, et al., (2018)**, who concluded that First line managers had low knowledge about Colonoscopy and nurses' perceptions about clinical supervision provided by the first line managers was low level and continuing education is important to maintain high level on nurses. This finding congruent with **Mohamed, (2014)**, who revealed in his study that two thirds of nurses had unsatisfactory level of practice during surgical endoscopic procedure including: (Hand washing, Keeping equipment sterile, and avoiding talking, coughing, sneezing, decreasing movement on the room ,Following aseptic technique).

As regarding to effect of implemented holistic package on the nurses' practice regarding patient undergoing endoscopic procedure (pre cleaning of endoscope, leak testing, cleaning of the endoscope, rinsing using fresh clear water) . The majority of nurses were good for these activities immediately & one month post implementation of holistic package. And there were statically significant in all items this may be due to good effect of researchers during slips when giving holistic package. This result was agreement with **Mohamed (2014)**, who reported that two thirds of nurses had a satisfactory practice post program. In the same direction, **Baumgardner, (2017)**, who portrayed that nurses can be efficiently trained to help in perform upper endoscopies, and present high-quality upper endoscopies

As regards to nurses' level of practice regarding infection control and patients safety measures, the results were very highly statistical significant in all items in the phases this is may be related to daily routine of endoscopic hygiene between patient and at the end of all patients so the holistic package is efficient . These findings supported by **Baumgardner, (2017)**, who found that all studied subjects had satisfactory practice post-surgical endoscopic procedure. This agreed with **Jasinki, (2019)**, who reported that, continuing training must result in practice change to be effective. These results in agree with **Mohamed, (2014)**, whose study regards to nurses' level of practice regarding infection control measures to endoscopy sterilization & revealed that: more than two third of nurses had unsatisfactory practice immediately after surgical endoscopic procedure.

Regarding to the correlation between the nurses' knowledge scores and their practice scores, it was showed that there was positive correlation between knowledge score and practice score. This may be due to the effect of holistic package for nurses on nursing performances; this is agreed with **Ahmed, (2007)**, who found that there was high statistically significant relation between nurses' knowledge and practice.

correlation between the nurses' knowledge & practice score and their demographic variables study revealed that there was a positive correlation between knowledge score and education, also practice score and education, however there was a negative correlation between knowledge score and (age & years of experience), moreover practice score and (age & years of experience). The correlation was statistically significant where $p\text{-value} < 0.05$, except; knowledge score & education and practice score & age where $p\text{-value} < 0.05$. Professional nurses are regarded as the backbone of the health care system and quality patient care is linked to patient safety (**Mokoena, 2017**)

V. CONCLUSION

The present findings concluded that there were very highly statistical significant improvement in all items that related to infection control and patients' safety measures throughout study phases. There was statistically significant improvement in total level of nurses' knowledge & practice toward patients' safety measures, infection control, and all activity regarding GI endoscopy after implementation of holistic package of quality nursing care for patient undergoing GI endoscopy through different study phases. Also there was positive correlation between knowledge and practice scores, but there was negative correlation between knowledge score and (age & years of experience), moreover practice score and (age & years of experience).

VI. RECOMMENDATIONS

According to study findings the following was recommended:

- 1- Improvement level of nurses' knowledge & practice toward infection control, patients' safety measures through implementing an educational training program.
- 2- The holistic package of quality nursing care should be applied & evaluated periodically on endoscopic units.
- 3- Distribute guidelines about quality nursing care for all endoscopic nurses to improve their efficiency.
- 4- Further researchers: Conducting educational training programs about enhancing safety measures, infection control, and patients' right for patient undergoing GI endoscopy.

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