

Nurses' performance and postoperative outcome among patients undergoing gastrointestinal surgery

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Abstract

Background: Gastrointestinal surgery is a specific surgical area where different patients are involved and ensuring a positive postoperative outcome after major surgery is still a difficult goal to achieve so, the process of nursing care in gastrointestinal surgery is specific because of the limited time of patient hospitalization, so nurses' play a core role in the management of patients undergoing gastrointestinal surgery. **Aim of the study:** To assess nurses' performance and postoperative outcome among patients undergoing gastrointestinal surgery. **Subjects and Methods; Research design:** A descriptive research design was carried out in this study. **Setting:** The present study was conducted in gastrointestinal surgical unit, surgical operation and post anesthetic care units at Zagazig university hospitals. **Subjects:** A convenience sample of all available nurses (30) working in the mentioned setting and a purposive sample of 70 patients who fulfilling the inclusion criteria. **Tool of data collection:** Three tools were used for collecting data. Tool I: A self-administrated questionnaire about studied nurses. Tool II: An observational checklist questionnaire for perioperative nursing care. Tool III: Interview assessment questionnaire for patients. **Results:** Majority of studied nurses (80%) had unsatisfactory total knowledge, nearly three quarter (73.3%) had unsatisfactory total practice regarding care of patient undergoing gastrointestinal surgery and more than half had moderate postoperative surgical outcome. **Conclusion:** The majority of nurses' had unsatisfactory total knowledge and practice regarding care of patients undergoing gastrointestinal surgery, there were statistical significant positive correlation between total nurses' knowledge and total nurses' practice and there were no statistical significance correlation between total patients' postoperative outcome and total nurses' knowledge and practice. **Recommendation:** Training programs are recommended to improve nurses' knowledge and practice regarding care of patients undergoing gastrointestinal surgery. Apply instructional sessions for patients undergoing surgery in the preoperative phase to raise their awareness regarding postoperative quality of recovery and postoperative problems. Study should be replicated on large sample and in different hospital setting in order to generalize the result.

Key words: Nurses' Performance, Postoperative Outcome, Gastrointestinal Surgery.

Introduction:

Gastrointestinal (GI) surgery encompasses a large number of surgical and procedural interventions to diagnose, treat, and prevent spread of pathologic conditions. Curative procedures coupled with palliative techniques which can assist with alleviating debilitating symptoms of disease, allowing for comfort and nutritive capabilities while promoting quality of life and death with dignity ⁽¹⁾. GI surgery encompasses surgical management throughout the GI tract, which includes the esophagus, stomach, small and large intestines, and rectum. Surgery may be used to remove a cancerous or noncancerous growth or damaged part of

the body, such as the intestine. It may also be used to repair a problem like a hernia. Minor surgical procedures are used to screen and diagnosis problems of the digestive system ⁽²⁾.

The need remains to better understand patient outcomes following gastrointestinal surgery, to ensure the planning of effective perioperative care, including surgical approach and postoperative provision of critical care. The International Surgical Outcomes Study (ISOS) was recently conducted to evaluate the incidence and risk factors for complications and death after in-patient elective surgery at a global level, and to

describe current standards of postoperative care. The clinical outcomes and standards of perioperative care following gastrointestinal surgery at a global level, and to describe factors associated with complications during the hospital stay and death in this population⁽³⁾.

Nurses take care of the outcomes of surgery and suffering. They assess anesthesia and surgery risks and assist patients in the accomplishment of the activities of daily living, which are normally limited or impossible after surgery. Appropriate high-level nursing competencies are necessary, because even simple tasks, such as personal hygiene or mobility, cannot be performed by the patient alone due to limitations caused by the surgery. This includes surgery-related limitations in mobility as well as in combination with other existing restrictions. Furthermore, medical treatments, such as wound care and drug therapy, also require high competencies in nursing. Both the support in activities of daily living and the assumed tasks of medical treatment ask for high-level knowledge and skills as well as competencies to act adequately⁽³⁾.

Significance of the study:

Gastrointestinal surgery has evolved dramatically with improved perioperative outcomes over the past few decades. However, complication rates still remain high (33-44%)⁽⁴⁾. Complications from surgery such as surgical site infections and respiratory and cardiopulmonary events represent a substantial burden for both patients and health-care systems. Major morbidity occurs in between 4% and 16% of all inpatient surgical procedures in developed countries, with perioperative mortality and severe disability occurring in 1% of cases. In developing countries, mortality rates reportedly increase to up to 0.24-10% of cases.

Surgical procedures with major complications cost significantly more than surgery without any complications⁽⁵⁾. Current nursing literature supports the fact that the practice of registered nurses increases positive health outcomes in the form of decreased complications and an

increase in client safety & plays an important part in the care of surgical patients. Good patient outcome has become exceedingly important and the primary treatment goal of hospitals, therefore this study will be carried out in attempt to assess nurses' performance and postoperative outcomes among patients undergoing gastrointestinal surgery.

Aim of the study:

Was to assess nurses' performance and postoperative outcome among patients undergoing gastrointestinal surgery.

Research Questions:

- What is the level of nurses' knowledge regarding care of patients undergoing gastrointestinal surgery?
- What is the level of nurses' practice regarding care of patients undergoing gastrointestinal surgery?
- What are postoperative outcome among patients undergoing gastrointestinal surgery?

Subjects and methods:

Research design:

A descriptive exploratory design was used.

Study setting:

The present study was conducted in gastrointestinal surgical unit, surgical operation and post anesthetic care unit at Zagazig University Hospitals.

Study subjects:

A convenience sample of all available nurses (30) working in the mentioned setting and a purposive sample of (70) patients who fulfilling the inclusion criteria.

Inclusion criteria:

Patients who are undergoing gastrointestinal surgery, male and female, between 20 and 60 years and agree to participate in the study.

Exclusion criteria:

Patients with multiple traumas, pregnant women, have impaired level of consciousness and who had abdominal cancer.

Tools of data collection:

Three tools were used to collect necessary data.

Tool I: Self-administered questionnaire of nurses: Composed of two parts:

Part I: Used to assess demographic characteristics of nurses as: age, gender, marital status, educational qualifications, residence, income, total years of experience and attendance of any training courses (8 closed ended questions).

Part II: Used to assess nurses' knowledge regarding perioperative care for patients undergoing gastrointestinal surgery including three different sections, nurses' knowledge about preoperative care (**Hassan et al.**⁽⁶⁾). Nurses' knowledge about intraoperative care (**Rothrock et al.**⁽¹⁾) and nurses' knowledge about postoperative care (**Lemos & Poveda**⁽⁷⁾). It was adapted and modified by the researcher.

Scoring system:

Each correct answer scored one grade, zero for incorrect answer or don't know. For each area of knowledge, the score of the items was summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. Knowledge was considered satisfactory if the percent score was equal or above 80% and unsatisfactory if less than 80% based on statistical analysis.

Tool II: Observational checklists for nurses: It was used to assess nurses' practices regarding care of patients undergoing gastrointestinal surgery. Attenuated observational checklist was developed by the researcher. It consists of three parts.

Part I: Preoperative Care Checklist which composed of 19 items (**Indra & Kulsum**⁽⁸⁾).

Part II: Intraoperative Care Checklist which composed of 15 items (**Lemos & Poveda**⁽⁷⁾).

Part III: Postoperative Care Checklist which composed of 17 items (**Halterman et al.**⁽⁹⁾).

Scoring system:

The items observed to be done correctly were scored one and the items not done or incorrectly were scored zero for each area. The score of the items

were summed-up and the total divided by the number of the items. These scores were converted into percent scores. The nurses had satisfactory level of practice when the total score equal or above 80% and unsatisfactory if below 80% based on statistical analysis.

Tool III: Interview Patient's Assessment Questionnaire: This questionnaire divided into three parts:

Part I: Demographic characteristics of the studied patients: Which were composed of nine closed ended questions including patient's age, gender, marital status, educational qualification, residence, and job/occupation.

Part II: A questionnaire to assess past medical and surgical data: This consisted of 58 closed ended questions (**Sharm**⁽¹⁰⁾).

Scoring system:

Each item with (Yes) was scored one and the (No) scored zero. The score of the items were summed- up and the total divided by the number of the items. These scores were converted into percent score.

Part III: Questionnaire to assess patient's postoperative outcome which assessed by two scales:

First: Aldrete scale (Phase I): It is measured by evaluating five criteria, including patient's activity, respiration, circulation, consciousness and oxygen saturation (**Roelandt et al.**⁽¹¹⁾).

Scoring system:

Total scores were summed up for each criterion. Patients was scores (9-10) can be safely discharged from the PACU. Aldrete score of 8 or lower indicate the need for continuous closed observation.

Second: QoR-15 scale (Phase II): It is scale consisting of horizontal line for estimation of postoperative outcome which including of two parts. Part A, consists of 10 items each items from 0 to 10 where: 0 = none of the time [poor] and 10 = all of the time [excellent]. Part B, composed of 5 items each item from (10 to 0, where: 10 = none of the time [excellent] and 0 = all of the time [poor]) (**Rahman et al.**⁽¹²⁾).

Scoring system:

QoR-15 scores were divided into four broad categories, the score of the items were summed-up, these scores were converted into percent score, and the mean, standard deviations were calculated.

Content validity & Reliability:

The tools were revised by a panel of five experts of one assistant professor of anesthesiologist and four assistant professors of medical surgical nursing reviewed the tool's content for clarity, relevance, comprehensiveness, applicability, understanding, and ease for implementation. All recommended modifications were done. Cronbach's Alpha that used to measure the internal consistency (reliability of used tool) was 0.806 for Nurse's knowledge; Postoperative patient's outcome was 0.822, while Cronbach's Alpha for observational check list for nurses' practice was 0.789.

Fieldwork:

Once the approval was granted to progress in the study, the researcher started to organize a schedule for collecting the data. The researcher visited study setting to be familiar with work process, time of work and observe study subjects attending the study settings to a set schedule for data collection. The researcher used to go to the study setting for interviewing the study subjects, each nurse was met individually, got a full explanation about the aim of the study and was invited to participate. The nurse who gave his/her written informed consent to participate was handed the self-administered questionnaire and was instructed during the filling. The same was done with patients. The time needed to complete the checklist varies between 30 - 45 minute. The data were collected two days a week (Saturday and Sunday) in the morning and afternoon shifts, lasted for 6 months during the period from the beginning of August 2022 to the end of January 2023.

Pilot study:

It was carried out in order to check and ensure the clarity, applicability, relevance and feasibility of the tools. For this study, the researcher selected three

nurses and seven patients (10%) a random to participate in the pilot testing of the questionnaire and checklist from gastrointestinal surgical unit, surgical operation and post anesthetic care units and not excluded from the study sample because of no modifications in the tools.

Administrative and ethical considerations:

An official permission for data collection in Zagazig University was obtained from the hospital administrative personnel by the submission of a formal letter from the Dean of the faculty of Nursing Zagazig University explaining the aim of the study in order to obtain permission and help. At the interview, each subject was informed about the purpose, benefits of the study, and studied nurses were informed that participation is voluntary, and they have right to withdraw from the study at any time without given any reason. In addition, confidentiality, and anonymity of the subjects were assured through coding of all data. The researcher assured that the data collected will be confidential and would be used only to meet the purpose of the study.

Statistical analysis:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test (X) 2, P-value to test association between two variables, degrees of significance of results were considered as P-value > 0.05 Not significant (NS), P-value ≤ 0.05 Significant (S), P-value ≤ 0.01 Highly Significant (HS).

Results:

Table 1: Showed demographic characteristic of studied nurses. Their age ranged from 21-42 with Mean ± SD= 25.73 ± 5.57, nearly three quarters of nurses (70.0%) were females, majority of nurses (80.0%) were single. regarded their qualification 10.0% had nursing

diploma, 30.0% had technical institute, 60.0% had bachelor of nursing, more than half had hospital experience <5 years. furthermore; about three quarters (73.3%) of studied nurse hadn't attended training course regarding care of patients undergoing gastrointestinal surgery.

Figure 1: Showed total nurses' knowledge, majority of studied nurses (80%) had unsatisfactory total knowledge regarding care of patient undergoing general anesthesia compared to 20% of studied nurses had satisfactory total knowledge.

Figure 2: showed nurses' practice, about three quarters of studied nurses (73.3%) had unsatisfactory total practice regarding to care of patient undergoing general anesthesia, compared to (26.7%) of them had satisfactory total practice.

Table 2: Showed demographic characteristics of the patients in the study sample, revealed that that most of patients > 30 years, more than half (60.0%) were females, majority of patients (82.9%) were married, more than two third living in rural area, more than half (52.9%) did not working more than half (52.9%) didn't not working.

Table 3: As regard aldrete score, majority of studied patients (87.1%) able to move all extremities voluntarily /on command, more than three quarters (81.4%) had normal o₂ saturation, about three quarters (74.3%) had normal blood pressure, 70% of studied patient fully awake and more than half (55.7%) able to breathe deeply and cough freely respectively. On other hand, 42.9% dyspneic, shallow breathing and need supplemental oxygen, more than quarter (25.7%) had slightly abnormal blood pressure and 20.0% a rosable on calling.

Table 4: As regard QoR-15 scale, majority of studied patients had poor outcome related to return to usual activities and looking after personal toilet and hygiene unaided (81.4%, 78.6%) respectively, nearly half had moderate outcome related to feeling rested and communicate with family and friends (48.6% & 41.4%) respectively, more than half (51.4%) had good outcome

related to breathing easily, about three quarters (74.3%) had excellent outcome related to taking support from nurses and doctors. Regarding part B of scale, about half of studied patients had good outcome related to feeling pain, nausea, vomiting, worried, anxious, sad and depressed (50%, 42.9%, 61.4%, & 51.4%) respectively.

Figure 3: As regard total postoperative outcome, less than two third of studied patients (60%) had moderate surgical outcome and nearly third (30%) had poor surgical outcome. While less percentage included good surgical outcome (7.1%) and excellent surgical outcome was (2.9%).

Table 5: As regard correlation between the studied nurses' knowledge and practice, there were highly significant statistical positive correlation between total nurses' knowledge and total nurses' practice regarding perioperative care for patient undergoing gastrointestinal surgery with P-value 0.000.

Table 6: As regard relationship between demographic data of the studied patients and their total postoperative outcome, there were statistically significance relation between patients' total postoperative outcome and their demographic data as age, body mass index (P < 0.05). While there were no statistically significance relation with their gender, marital status, residence, educational level and their job (P > 0.05).

Table 7: As regard correlation between the studied patients' postoperative outcome and nurses' knowledge and practice, there were no statistical significance correlation between total postoperative outcome and total nurses' knowledge and total practice.

Discussion:

Regarding to the age of studied nurses, the result of present study showed that nearly to three quarters of studied nurses ≤ 30 years. These results were matched with **Elsayed et al.**⁽¹³⁾ who showed that nearly to three quarters of nurses less than 30 years. While this finding was controversy with that **Mohamed**⁽¹⁴⁾ who reported that more than half of nurses > 30 years.

As regard to qualifications, the current study results revealed that more than half of studied nurses were bachelor of nursing. This finding was on the same line with that of **Arzani et al.** ⁽¹⁵⁾ who reported that more than half of nurses were had bachelors' degree in nursing. While this finding was controversy with **Mohamed et al.** ⁽¹⁶⁾ who reported that more than half of nurses were diploma.

As regard to years of experience, the current study results revealed that more than half of studied nurses had years of experience less than five years. This finding was on the same line with that of that **Mohamed et al** ⁽¹⁶⁾ reported that nearly half of nurses had years of experiences less than five years.

As regard to total nurses' knowledge about preoperative care for patient undergoing gastrointestinal surgery, more than three quarters of studied nurses had unsatisfactory knowledge. This finding was controversy with of **Elsayed et al.** ⁽¹³⁾ showed that majority of nurses had good knowledge about preoperative care.

As regard to nurses' knowledge about intraoperative care for patient undergoing general anesthesia, the current study clarified that majority of studied nurses had unsatisfactory knowledge. This finding is in agreement with **Abd Elgilil et al.** ⁽¹⁷⁾ who reported that more than three quarters of studied nurses had unsatisfactory knowledge regarding role of nurse for patient in operating room.

As regard to nurses' knowledge about postoperative nursing care, the current study clarified that majority of studied nurses had unsatisfactory knowledge. This finding is in agreement with Gouda et al ⁽¹⁹⁾ who reported that majority of nurses had unsatisfactory knowledge regarding postoperative nursing performance in the surgical units.

As regard to Practice of preoperative care assessment. The study revealed that majority of studied nurses performed steps incorrectly. These finding in the same consequence with **Abd Elhafiez et al.** ⁽¹⁸⁾ who reported that more nearly three quarters of nurses had unsatisfactory level of practices of preoperative nursing care.

As Regard to Practice of intraoperative care assessment. The study revealed that two third of studied nurse performed intraoperative steps incorrectly. These finding in the same consequence with **McGinlay et al.** ⁽¹⁹⁾ who studied reported that most poorly performed practice through during time out phase.

As Regard to Practice of postoperative care assessment. The study revealed that majority of nurses performed steps incorrectly. These finding in the same consequence with **AbdElgilil et al.** ⁽²⁰⁾ showed that nearly three quarter of nurses' had incompetent total practice in care for patients undergoing Laparoscopic Cholecystectomy.

Regarding to demographic characteristics of the studied patients, the result of present study showed that majority of studied patients more than 30 years. These results were matched with **Afroz et al.** ⁽²¹⁾ found that majority of patients more than 30 years. Half of studied patients were female. This finding was on the same line with **SAGÜN et al.** ⁽²²⁾ who reported that more than half of studied patients were females. As regard previous history of surgery, the current study results revealed that more than quarter had previous surgery. This finding on the same line with **Pascal et al.** ⁽⁵⁾ who reported that about third of patients had previous surgery.

As regard to total postoperative outcome, more than half of studied patients had moderate surgical outcome. This finding was on the same line with **Campfort et al.** ⁽²³⁾ who studied and reported than nearly half of patients had total moderate postoperative outcome.

As regard the correlation between nurses' total knowledge and total practice, the finding of current study indicated that there was highly a statistical positive relation between nurses' total knowledge and total practice. This finding was gone in line with **Gouda et al.** ⁽²⁴⁾ who stated that statically positive relation between nurses' total knowledge and total practice.

Conclusion:

Based on the results of the present study, it could be concluded that, majority of studied nurses had unsatisfactory total knowledge regarding perioperative nursing care for patients undergoing gastrointestinal surgery, nearly three quarter of nurses had unsatisfactory total practice, more than half of patients had moderate surgical postoperative outcome, there was statistically significant positive correlation between total nurses' knowledge and total nurses' practice and there were no statistical significance correlation between total patients' postoperative outcome and total nurses' knowledge and practice.

Recommendations:

In view of the main results of the study the following recommendations were derived and suggested, training programs are highly recommended to improve nurses' knowledge and practice regarding care of patients undergoing gastrointestinal surgery. Standard nursing procedures booklet should be available to guide nurses giving the adequate care for patient undergoing gastrointestinal surgery. Apply instructional sessions for patients undergoing surgery in the preoperative phase to raise their awareness regarding postoperative quality of recovery and postoperative problems. Study should be replicated on large sample and in different hospital setting in order to generalize the result.

Table 1: Frequency and percentage distribution of demographic characteristics of studied nurses (n= 30)

Demographic characteristics of nurses	NO	%
Age (Years)		
20-<30	22	73.3
30-<40	5	16.7
≥ 40	3	10.0
Mean ± SD= 25.73 ± 5.57		
Gender		
Male	9	30.0
Female	21	70.0
Educational Qualification		
Diploma	3	10.0
Technical Institute	9	30.0
Bachelor of Nursing	18	60.0
Marital State		
Single	24	80.0
Married	6	20.0
Residence		
Rural	25	83.3
Urban	5	16.7
Income		
sufficient	17	56.7
Insufficient	13	43.3
Years of experiences		
< 5	16	53.3
≥ 5	14	46.6
Mean ± SD= 5.23 ± 4.90		
Attending a training course		
Yes	8	26.7
No	22	73.3

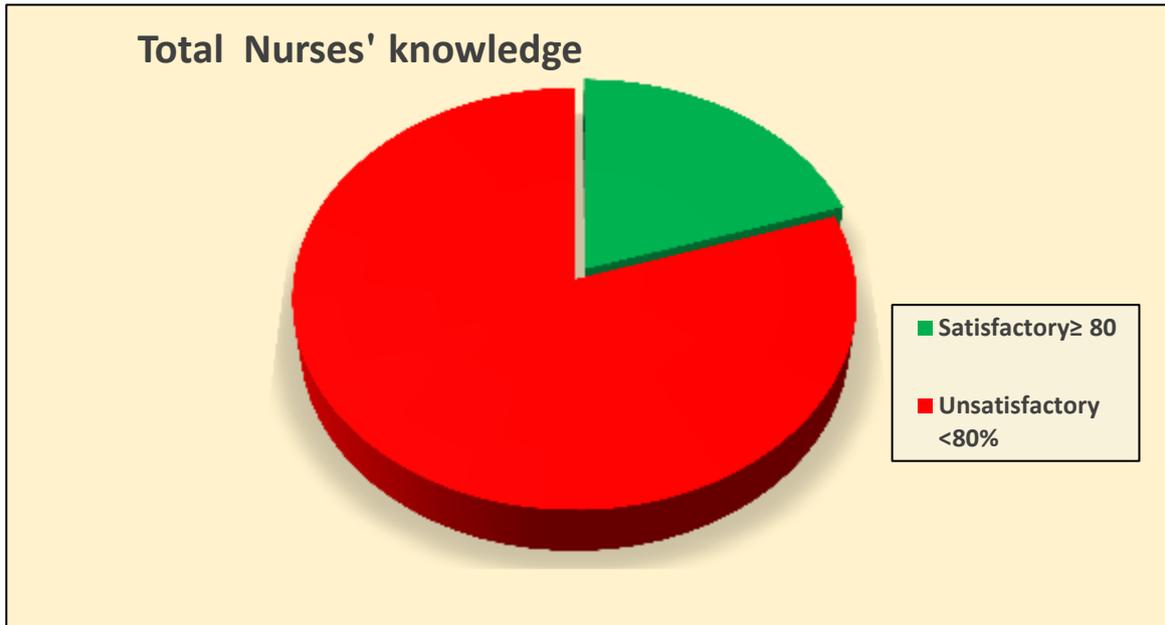


Figure 1: Distribution of the studied nurses according to their total knowledge about perioperative nursing Care (n=30)

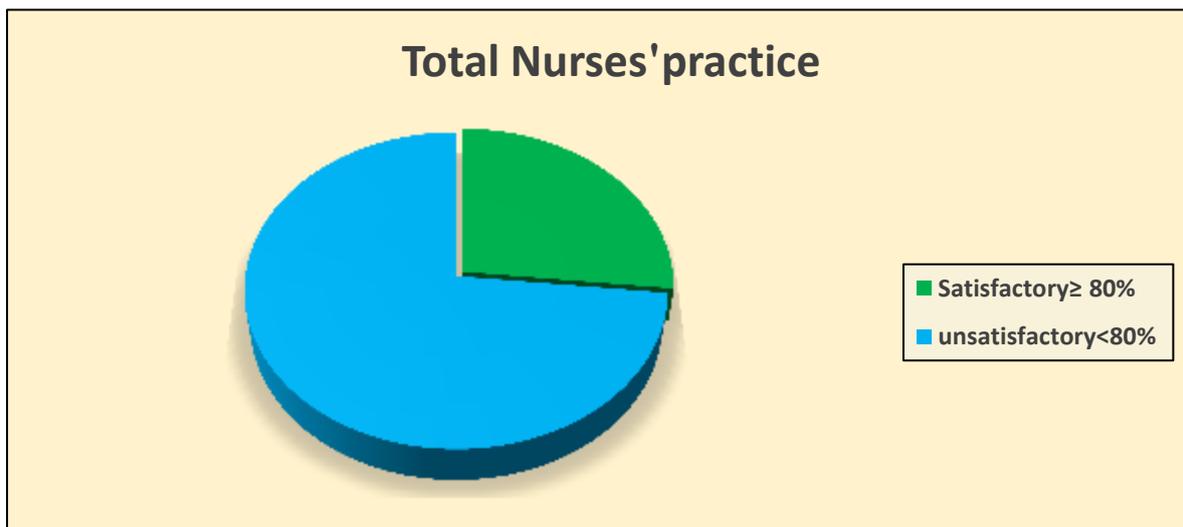


Figure 2: Distribution of the studied nurses according to their total practice about perioperative nursing care (n=30)

Table 2: Frequency and percentage distribution of demographic characteristics of studied patients (n= 70)

Demographic Data of Studied Patients	No	%
Age (Years)		
20-< 30	5	7.1
30-<40	23	32.9
40-<50	21	30.0
50-60	21	30.0
Mean \pm SD= 43.56 \pm 5.87		
Gender		
Male	28	40.0
Female	42	60.0
Marital status		
Single	3	4.3
Married	58	82.9
Divorced	3	4.3
Widow	6	8.6
Residence		
Urban	23	32.9
Rural	47	67.1
Educational level		
Not read or write	15	21.4
primary or preparatory education	17	24.3
Secondary education	20	28.6
High education	18	25.7
Job /occupation		
Working	33	47.1
Not working	37	52.9

Table3: Frequency and percentage distribution of the studied patients regarding Aldrete score (phase I immediately after anesthesia) (n=70)

Aldrete scale		No.	%
Activity	Move all extremities voluntarily /on command	61	87.1
	Move two extremities voluntarily /on command	2	2.9
	Unable to move extremities voluntarily/ on command	7	10.0
Respiration	Able to breathe deeply and cough freely	39	55.7
	Dyspneic, shallow breathing	30	42.9
	apneic	1	1.4
Circulation	Blood pressure + /- 20 mmhg of normal	52	74.3
	Blood pressure + /- 20 -50 mmhg of normal	18	25.7
	Blood pressure + /- 50 mmhg of normal	0	0.0
Consciousness	Fully awake	49	70.0
	Arousable on calling	14	20.0
	Not responding	7	10.0
O2 saturation	Able to maintain O2 saturation more than 92% on room air	57	81.4
	Supplemental O2 required to maintain SP0>92%	12	17.1
	SPO2<90% with O2 supplementation	1	1.4

Table4: Frequency and percentage distribution of the studied patients regarding QoR-15 Scale (Phase II) (n=70)

Statements	Poor 0-5		Moderate 6-7		Good 8-9		Excellent 10		Mean \pm SD
	No.	%	No.	%	No.	%	No.	%	
Able to breath easily	27	38.6	5	7.1	36	51.4	2	2.9	6.67 \pm 2.72
Been able to enjoy food	51	72.9	8	11.4	9	12.9	2	2.9	4.14 \pm 2.37
feeling rested	20	28.6	34	48.6	15	21.4	1	1.4	6.27 \pm 1.85
Have had a good sleep	19	27.1	7	10.0	0	0.0	2	2.9	7.07 \pm 2.50
Able to look after personal toilet and hygiene unaided	55	78.6	15	21.4	0	0.0	0	0.0	4.33 \pm 1.61
Able to communicate with family or friends	17	24.3	29	41.4	20	28.6	4	5.7	6.47 \pm 2.50
Getting support from hospital doctors and nurses	5	7.1	0	0.0	13	18.6	52	74.3	9.34 \pm 1.78
Able to return to usual activities	57	81.4	9	12.9	2	2.9	2	2.9	4.13 \pm 1.76
Feeling comfortable and in control	22	31.4	28	40.0	18	25.7	2	2.9	6.16 \pm 1.91
Having feeling of general well-being	25	35.7	26	37.1	17	24.3	2	2.9	6.06 \pm 2.20
*Moderate pain	25	35.7	16	22.9	27	38.6	2	2.9	6.39 \pm 2.03
* Severe pain	11	15.7	19	27.1	35	50.0	5	7.1	7.30 \pm 2.27
*Nausea or vomiting	32	45.7	2	2.9	30	42.9	6	8.6	6.59 \pm 2.72
*Feeling worried or anxious	3	4.3	16	22.9	43	61.4	8	11.4	8.09 \pm 1.58
* Feeling sad or depressed	8	11.4	16	22.9	36	51.4	10	14.3	7.67 \pm 2.17
Total postoperative outcome score	21	30.0	42	60.0	5	7.1	2	2.9	96.67 \pm 16.82

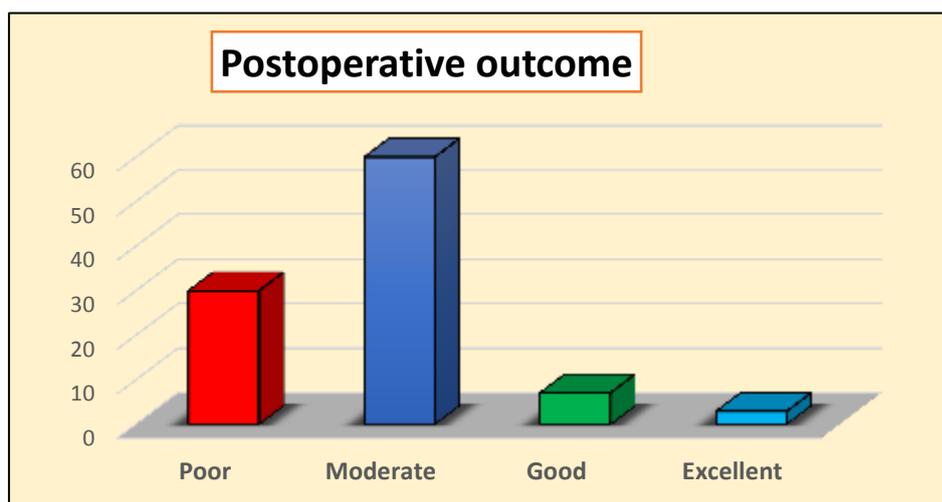


Figure 3: Distribution of the studied patients according to their total postoperative outcome [Lemos & Poveda] (n=70)

Table 5: Correlation between the studied nurses' knowledge and practice (n=30)

Variables	Total practice	
	r	p-value
Total knowledge	0.512	0.000**

Table 6: Relation between demographic data of the studied patients and their total postoperative outcome (n=70)

Demographic data	Levels of total postoperative outcome								X ²	P-Value	
	Poor (n=21)		Moderate (n=42)		Good (n=5)		Excellent (n=2)				
	No.	%	No.	%	No.	%	No.	%			
Age (years)	20-<30	2	9.5	3	7.1	0	0.0	0	0.0	15.71	< 0.05* (S)
	30-<40	2	9.5	15	35.7	4	80.0	2	100.0		
	40-<50	7	33.3	13	31.0	1	20.0	0	0.0		
	50-60	10	47.6	11	26.2	0	0.0	0	0.0		
Gender	Male	10	47.6	15	35.7	2	40.0	1	50.0	0.913	> 0.05 (NS)
	Female	11	52.4	27	64.3	3	60.0	1	50.0		
Marital Status	Single	1	4.8	1	2.4	1	20.0	0	0.0	8.575	> 0.05 (NS)
	Married	18	85.6	35	83.3	3	60.0	2	100.0		
	Divorced	1	4.8	1	2.4	1	20.0	0	0.0		
	Widow	1	4.8	5	11.9	0	0.0	0	0.0		
Residence	Urban	7	33.3	14	33.3	2	40.0	0	0.0	1.101	> 0.05 (NS)
	Rural	14	66.7	28	66.7	3	60.0	2	100.0		
Education level	Not read or write	3	14.3	11	26.2	1	20.0	0	0.0	11.15	> 0.05 (NS)
	Primary	7	33.3	10	23.8	0	0.0	0	0.0		
	Secondary	7	33.3	10	23.8	1	20.0	2	100.0		
	High	4	19.0	11	26.2	3	60.0	0	0.0		
Job /occupation	Working	10	47.6	19	45.2	3	60.0	1	50.0	0.401	> 0.05 (NS)
	Not working	11	52.4	23	54.8	2	40.0	1	50.0		
Body Mass Index (kg/m ²)	Underweight	0	0.0	2	4.8	0	0.0	0	0.0	12.31	< 0.05* (S)
	Normal weight	2	9.5	5	11.9	2	40.0	0	0.0		
	Overweight	8	38.1	18	42.9	1	20.0	2	100.0		
	Obesity	11	52.4	17	40.5	2	40.0	0	0.0		

Table 7: Correlation between the studied patients' postoperative outcome and nurses' knowledge and practice

Variables	Total knowledge		Total practice	
	r	p-value	r	p-value
Total postoperative outcome	0.094	0.621	0.161	0.395

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