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Predictive Factors Affecting Postoperative Quality of Recovery for Patients Undergoing Surgery

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Abstract: *The assessment of quality of recovery after surgery and anesthesia is considered an important issue because it provides information that could help to identify problems that may affect postoperative quality of recovery. This study aimed to assess the predictive factors affecting postoperative quality of recovery for patients undergoing surgery through the following: (1) Assessment of patients' demographic characteristics. (2) Assessment of patient's medical data. (3) Assessment of patient's awareness with the recovery process and postoperative problems. (4) Assessment of the postoperative quality of recovery in patients undergoing surgery. (5) Assessment of predictive factors affecting the postoperative quality of recovery in patients undergoing surgery. Cross-sectional descriptive research design was utilized to conduct this study. The study was conducted in the surgery wards at El-Demerdash hospital affiliated to Ain Shams University Hospitals, Egypt. A purposive sample of 100 patients who were admitted to the previously mentioned settings was included in the study. Data collection tools: (1) Demographic data questionnaire. (2) Postoperative patient's medical data assessment tool. (3) Postoperative patient's knowledge assessment questionnaire. (4) Quality of Recovery Score Questionnaire (QoR-40). The results showed that 36% of patients had good total quality of recovery, 19% had excellent recovery, 39% had acceptable quality of recovery, while 6% only had poor quality of recovery. There were highly statistically significant differences between total quality of recovery and age, gender, type and duration of surgery and presence of other diseases. Conclusion: It was concluded that there are several factors affecting the postoperative quality of recovery for patients undergoing surgery such as patient's gender, age, type of surgery, duration of surgery, presence of other diseases, as well as pain control. Recommendations: Conducting comprehensive patients' assessment pre and postoperative in order to identify any factors that may affect the postoperative quality of recovery of patients.*

Keywords: *Predictive factors, Postoperative patients, Quality of recovery, Surgery.*

I. Introduction

Quality of recovery (QoR) after anesthesia and surgery is an important measure of the early postoperative health status of patients. Surgery and anaesthesia have certain inevitable negative impacts on the quality of life of patients, manifest as various discomforts after surgery even without specific complications [1]. The time immediately following a general anaesthetic is a critical period for patient recovery, requiring intensive observation by nurses to enable early detection of complications from surgery [2].

In the nursing discipline, postoperative recovery is an energy requiring process of returning to normality and wholeness. This is achieved by regaining control over physical, psychological, social and habitual functions, which results in returning to the preoperative levels of independence/dependence in activities of daily living and optimum level of psychological wellbeing [3].

Recovery may be viewed and assessed as an endpoint or a process. Recovery may also be viewed as absolute or relative. Therefore, it is not necessarily obvious whether a patient has 'recovered' from their operation as the definition of 'recovered' can vary [4]. The recovery process therefore extends from the end of the anaesthetic and can continue over a period of several months after discharge, and occasionally not even returning to preoperative baseline. It is also clear that recovery is also a multidimensional process that includes: emotional (support, independence); physical (symptoms, function); psychological (cognition); social and habitual patterns (daily activities). When assessing the quality of post-operative recovery, it is critical that each of these dimensions be assessed by the scale [3].

The recovery phases after surgery can be categorized as early, intermediate and late. The early postoperative recovery phase has been defined as the first 24 h or the first seven days. The speed and extent of recovery in the early phase is influenced most by pain, nausea, peri-operative medications and delirium. The intermediate phase of postoperative recovery has been defined as the first 28 or 60 days, during which the patient awaits readiness for home discharge. The extent of recovery in the intermediate phase is influenced most

by pain, anxiety and depression, physical impairment and cognitive dysfunction. The late postoperative recovery phase has been defined as the first six weeks or three months, it comprises the time from discharge until the patient reaches the level of preoperative health and well-being. Symptoms that afflict the early and intermediate phases of recovery can persist into this extended period [4, 5].

Patient-reported outcomes have become one of the most important measures for assessing medical and surgical treatments [6]. Most studies evaluating recovery after anesthesia and surgery have focused primarily on physiological endpoints, recovery times, and the incidence of adverse events, such as major morbidity and mortality. Although these parameters are important and should be measured, they mostly ignore quality of recovery (QoR) from the patient's perspective [7].

During the past decade, a number of comprehensive and relevant instruments have been developed to assess quality of recovery in postoperative setting [8]. One of the most commonly used and promising assessment tools is the quality of recovery score questionnaire (QoR-40). The QoR-40 is a generic postoperative recovery instrument developed by Myles et al. in 1999 to assess the quality of recovery from surgery and anaesthesia from patients' perspectives [9].

The QoR-40 has since become the most widely reported measure of patient-assessed quality of recovery after surgery. The Quality of Recovery-40 questionnaire (QoR-40) probes a patient's recovery from surgery and anaesthesia using five dimensions of health: physical comfort, physical independence, emotional state, psychological support, and pain. The validity, reliability, ease of use, and responsiveness of the QoR-40 has been confirmed in previous studies, and has been used successfully to assess the degree of recovery after several different surgical and anaesthetic techniques [10, 11].

Recovery after surgery and anesthesia is a complex process that could be influenced by many factors that affect on its quality. These factors may includes age of the patient, the patient's pre-operative health status, type of surgical procedure performed, type and length of anesthesia, preexisting diseases or other medical conditions and the stability of vital signs as well as the presence of any of numerous adverse sequels [2, 7]. Nutritional status, hyperglycaemia, hypoglycaemia and insulin resistance are also variables that may affect quality and duration of recovery from surgery [12].

Preoperative preparation and postoperative care is a vital to patient safety and a key nursing role. Surgery, no matter how minor, is a worrying event for most people that causes stress, poses risks for complications and subject all patients undergoing surgery to a common set of problems, which requires standardized and individualized assessment and interventions. All patients require thorough preoperative education. Nursing goals when caring for surgical patients are to minimize clients' anxiety, prepare them for surgery, and assist in their speedy, uncomplicated recovery and improve outcomes [13].

Postoperative care, or the management of a patient after surgery, begins as soon as the procedure ends and continues until the patient has returned to their physiological preoperative state [14]. During the postoperative period, nursing care of the hospitalized patient on the general medical-surgical unit focuses on help the patient recover from the effects of anesthesia and surgery, frequently assessing the patient's physiologic status and reestablishing the patient's physiologic equilibrium, alleviating pain, monitoring and preventing complications, and implementing measures designed to achieve the long-range goals of independence with self-care. Careful assessment and immediate intervention assist the patient in returning to optimal function quickly, safely, and as comfortably as possible [15].

1.1 Significance of the study:

The patient's conditions after surgery and in the postoperative period are unstable or likely to change, and where potential for the rapid onset of complications exists. The nurses have significant role in the management of patients in the post operative unit setting. Nurses are required to assess and provide valuable information on patients' progress after surgery in order to clinically judge about the patients' recovery and their readiness to be discharged out of the surgical wards to home. Nurses should conduct an accurate assessment for patient undergoing surgery using an objective tool that able to measure the patient reported outcome and the quality of recovery from patient point of view in order to identify patients with poor quality of recovery and discharge patient safely. The nurses should also assess patients for the presence of any other factors that may affect quality of recovery of patients after surgery in order to avoid deterioration of patients, longer duration of hospital stay, as well as decrease the risk of serious complications or even death. Therefore, the aim of this study is to assess the predictive factors affecting postoperative quality of recovery for patients undergoing surgery.

1.2 Aim of the study:

This study aims to assess the predictive factors affecting postoperative quality of recovery for patients undergoing surgery through: (1) Assessment of patients' demographic characteristics. (2) Assessment of patient's medical data. (3) Assessment of patient's awareness with the recovery process and postoperative problems. (4) Assessment of the postoperative quality of recovery in patients undergoing surgery. (5) Assessment of predictive factors affecting the postoperative quality of recovery in patients undergoing surgery.

1.3 Research questions:

This study will answer the following questions:

1. What is the level of quality of recovery for patients undergoing surgery?
2. What are the predictive factors affecting the postoperative quality of recovery for patients undergoing surgery?

II. Methods

2.1 Research design:

Cross-sectional descriptive research design was used to achieve the aim of the present study.

2.2 Setting:

This study was conducted in the surgery wards that include (general surgery wards, orthopedic surgery wards, urological surgery wards, ophthalmology and ENT "Ear, Nose, Throat" surgical wards) at El-Demerdash hospital affiliated to Ain Shams University Hospitals, Cairo, Egypt.

2.3 Subjects:

Purposive samples of 100 patients who were admitted to the previously mentioned settings and fulfill the following selection criteria were included in the study. *Inclusion criteria included the following:* adult patient, age was 18 years or older, from both genders, undergoing different types of surgery and anesthesia, minimally 24 hours postoperatively, alert, not suffering from any psychiatric disorders or hearing and cognitive impairment and agree to participate in the study. The sample size calculation was done based on power analysis with type I error with significant level (α) =0.5, type II error by power test (1-B) =90%, found the minimum number should be 100 patients.

2.4 Tools for data collection:

2.4.1 Demographic data questionnaire:

This questionnaire was developed by the researchers to collect data about demographic characteristics of the study's subjects including; age, gender, marital status, residence, employment status and educational level.

2.4.2 Postoperative patient's medical data assessment tool:

This questionnaire was developed by the researchers in an Arabic language based on the review of related literatures [16] to assess postoperative patient's medical data such as type of surgery, date and duration of surgery, type of anesthesia, weight and height (body mass index) and presence of other diseases.

2.4.3 Postoperative patient's knowledge assessment questionnaire:

This questionnaire was developed by the researchers in an Arabic language based on the review of related literatures [15, 17] to assess patient's knowledge regarding recovery process and postoperative problems. It consisted of 25 Yes or No questions. The responses for the questions were either by true or false. The correct answer was given one grade, the incorrect answer was given zero, the total grade for the knowledge questionnaire was 25 grades, and the total scores for every patient were calculated. Then the mean of the total score for all patients was calculated. The satisfactory level of knowledge was considered ≥ 60% when the total grades were ≥ 15 grades, while the unsatisfactory level of knowledge was considered < 60% when the total grades were <15grades.

2.4.4 Quality of Recovery Score Questionnaire (QoR-40):

This questionnaire was adopted from Myles et al., 1999 [9] and translated into an Arabic language and then back translated by the researchers in order to assess postoperative health status of the patient. The quality of recovery score has 40 items; these items were categorized in five dimensions including emotional state (9 items), physical comfort (12 items), patient support (7 items), physical independence (5 items) and pain (7 items). All items are rated on a five-point Likert scale ranged from one (worst) to five (best), where 1= none of the time, 2= some of the time, 3= usually, 4= most of the time, 5= all of the time. All negative items were reversed to ease the interpretation. The maximum score of the scale is 200 degree which represents excellent quality of recovery from anesthesia and surgery, while the minimum score is 40 and represents extremely poor quality of recovery. The QoR-40 is known to be valid and reliable questionnaire with Cronbach's alpha scores for postoperative QoR- 40 subscales ranged from 0.89 to 0.93 and the global QoR-40 had an α value of 0.89 [16].

Scoring system:

This questionnaire is consisted of 40 statements. The responses for the positive statements were on a five-likert scale where 5= all of the time, 4= most of the time, 3= usually, 2= some of the time, 1= none of the

time. The responses for the negative statements were on a five-likert scale where 5= none of the time, 4= some of the time, 3= usually, 2= most of the time, 1= all of the time. The total score of the scale is 200 degree. The total score for the whole scale was calculated for every patient. Then the mean of the total score for all patients was calculated. The highest score indicate positive excellent quality of recovery from surgery, while the lowest score indicate poor quality of recovery. The scale includes 18 positive statements and 22 negative statements. The description of the quality of recovery calculated as following: ≤ 40 degree was considered very poor QoR, > 40 -80 was poor QoR, > 80 - 120 was considered acceptable average QoR, >120 -160 was good QoR and > 160-200 was excellent quality of recovery.

2.5 Tool validity and reliability:

- These questionnaires were reviewed by a jury of 5 experts (1 anesthesiologist and 1 surgeon in faculty of medicine, 1 professors and 2 assistants professors in medical surgical nursing department, faculty of nursing of Ain Shams University) in order to evaluate its face and content validity. The experts reviewed the tools for its content, clarity, simplicity, relevance, comprehensiveness, appropriateness and applicability. Minor modifications were done and then the final forms of the tools were developed.
- Testing the reliability of the postoperative patient's knowledge assessment questionnaire was done by alpha cronbach test which was 0.92.

2.6 Pilot study:

A pilot study was carried out on 10% of patients (10 patients) to test the applicability of the study and to test clarity of the designed questionnaire, as well as to estimate the time needed for each tool. The modifications were done for the used tools then the final form was developed. Patients of the pilot study were excluded from the study's subjects.

2.7 Ethical considerations:

The research approval was obtained from the faculty of nursing research ethics committee before initiating the study. Permissions for data collection from patients were obtained from the medical and nursing directors of the surgical wards where the study conducted. The researchers clarified the purpose and aim of the study to patients included in the study. Oral consent was obtained from patients to ensure willingness to engage in the study. The researcher maintained anonymity and confidentiality of subjects' data. Patients were informed that they are allowed to withdraw from the study at any time without penalty.

2.8 Procedure:

- Extensive reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop data collection tools. The aim and purpose of the study was explained by the researchers to the study subjects prior to data collection, as well as their approval to participate in the study was obtained. Data collection took about 5 months started from July 2016 until December 2016. The data were collected by the researchers through 2 days/ week (Monday, Wednesday), during the morning shift. Patients who fulfilled the selection criteria were interviewed individually by the researchers in order to fill out the study tools and assess the postoperative quality of recovery and predictive factors affecting it. Demographic and medical data were collected from the patients' medical records and from the patients themselves. The questionnaire took about 15-20 minutes to complete.

2.9 Data analysis:

All Data were collected, tabulated and subjected to statistical analysis. Statistical analysis is performed by SPSS version 17, also Microsoft office Excel is used for data handling. Quantitative variables are described by the Mean, Standard Deviation (SD) and the Range (Maximum – Minimum). Qualitative categorical variables are described by proportions and Percentages. One way analysis of variance (ANOVA) is used for comparing the means of more than two groups in the study sample. Independent samples t test is used for comparing the means of two groups in the study sample. Pearson correlation coefficient is used for correlation analysis of quantitative variables. Significance level is considered at $P < 0.05$ (S); while for $P < 0.01$ is considered highly significant (HS).

III. Results

Table (1): Demographic characteristics of the studied patients (N=100)

Patients' characteristics	No	%
Age group (years)		
< 25 years	7	7.0
≥ 25 – 40	30	30.0
≥ 40 – 60	43	43.0
≥ 60	20	20.0
Mean ± SD	45.39 ± 15.65	
Range	(18-80)	
Gender		
Female	40	40.0
Male	60	60.0
Level of education:		
Illiterate	26	26.0
Read & write	24	24.0
Secondary	21	21.0
Bachelor	29	29.0
Marital status:		
Single	10	10.0
Married	75	75.0
Widow	13	13.0
Divorced	2	2.0
Occupation		
Housewife	32	32.0
Mental effort	44	44.0
Physical effort	24	24.0
Residence		
Urban	45	45.0
Rural	55	55.0
BMI		
Mean ± SD	29.109 ± 5.37	
Range	16.42- 44.81	

Regarding demographic characteristics of the studied patients, table 1 shows that the mean age of the patients under study was 45.39 ± 15.65 and their age ranged from 18-80 years. As regard to gender, 60.0% of patients were males and 75% of them were married. In relation to level of education, 26% of patients were illiterate and 24% read and write. Also, 44% of patients have mental effort occupation and 32% were housewife. Regarding to residence, 55% of the studied patients live in rural area and the mean of patients' body mass index was 29.109 ± 5.37.

Table (2): The present surgical history of the studied patients (N=100)

Present surgical history	No	%
The surgery type		
General surgery	47	47.0
Orthopedic surgery	21	21.0
Ophthalmology/ ENT surgery	16	16.0
Urological surgery	16	16.0
The duration of surgery in **hours**		
< 2 hours	36	36.0
2 – 4 hours	39	39.0
4 – 6 hours	16	16.0
> 6 hours	9	9.0
Mean ± SD	2.59 ± 1.59	
Range	(1.0 – 8.0)	
Time of postoperative assessment		
1 –2 days	52	52.0
3 – 4 days	29	29.0
5 – 8 days	16	16.0
10 days	3	3.0
Mean ± SD	1.95 ± 2.04	
Range	(1.0 – 10.0)	
Type of anesthesia		
General	89	89.0
Epidural	11	11.0

As regard to present surgical history of patients under study, table 2 revealed that 47.0 % of the studied patients were undergoing general surgery. Regarding the surgery duration, 39% of patients, their surgery last for 2-4 hours and 36% of them lasts for less than 2 hours. Moreover, the time of postoperative assessment of patients, 52% of patients were postoperatively 1-2 days and 89.0% of them received general anesthesia during surgery.

Table (3): Percentage distribution of total patients' level of knowledge regarding postoperative problems and the recovery process and its correlation with postoperative total quality of recovery (N=100)

Percentage distribution of total patients' level of knowledge				**Correlation of total patients' knowledge and total quality of postoperative recovery**	
Satisfactory		**Unsatisfactory**			
N	**%**	**N**	**%**	**r**	**P value**
13	13.0%	87	87.0%	0.325	0.05*

Table 3 shows that, the majority (87%) of the studied patients had unsatisfactory knowledge regarding postoperative problems and the recovery process. Also, there was significant positive correlation between total patients' knowledge and postoperative total quality of recovery.

Table (4): Percentage distribution of postoperative quality of recovery level of the studied patients (N=100)

Total quality of recovery & its categories	**Quality of recovery levels**					**Mean**	**Std. Deviation**
	Very Poor	**Poor**	**Acceptable**	**Good**	**Excellent**		
Physical comfort	2	19	23	45	11	66.44	18.96
Emotional status	4	7	19	35	35	68.94	21.32
Pain	0	11	29	23	37	70.36	20.93
Patient support	0	5	4	29	62	80.56	17.27
Physical independence	4	32	20	24	20	47.50	21.74
Total quality of recovery	0	6	39	36	19	67.81	13.66

Table 4 shows that 19% of patients had poor quality of recovery in the physical comfort category, 32% of patients had poor quality of recovery in the physical independence category. In addition, 37% of patients under study had an excellent quality of recovery in the pain category, 62% of them had an excellent quality of recovery in patient support category. Regarding total quality of recovery, 36% of patients under study had good total quality of recovery, while 6% only of them had poor total quality of recovery.

Table (5): Relation between total quality of recovery and gender, type of work and educational level

Items	**Postoperative total quality of recovery**		
	Mean ± SD	**Test**	**P value**
Gender			
Males	63.87± 13.26	T= - 3.75	0.000*
Females	73.71±12.17		
Type of work			
House wife	61.47± 15.32	F= 9.276	0.000*
Mental effort	73.26± 9.28		
Physical effort	71.16± 1.51		
Educational level			
Illiterate	63.05± 10.25	F= 1.53	0.213
Read & write	68.38± 16.88		
Secondary	69.71± 10.38		
Bachelor	70.21 ± 15.00		

**p≤ 0.001 highly significant*

Table 5 shows that, there were highly statistically significant relation between postoperative total quality of recovery and patients' gender and between total quality of recovery and patients' type of work. While, there was no statistically significant relation between postoperative total quality of recovery and patients' educational level.

Table (6): Relation between postoperative total quality of recovery and type of anesthesia, type of surgery and the presence of other diseases

Items	Postoperative total quality of recovery		
	Mean ± SD	**Test**	**P value**
Type of anesthesia			
General	67.36 ± 14.01	T= -0.92	0.36
Epidural	71.37 ±10.27		
Type of surgery			
General surgery	73.40 ± 12.38	F= 3.05	0.032*
Orthopedic surgery	64.03 ± 14.75		
Ophthalmology/ENT surgery	67.39 ± 8.86		
Urological surgery	71.96 ± 13.21		
Presence of the other disease			
NO	69.38 ± 12.99	F= 3.81	0.012*
Hypertension	58.04 ± 16.04		
Diabetes	67.07 ± 8.64		
Hepatitis	48.73 ± 18.42		

**p≤ 0.001 highly significant*

Table 6 shows that, there was no statistically significant relation between postoperative total quality of recovery and type of anesthesia. While, there was statistically significant relation between postoperative total quality of recovery and type of surgery, as well between postoperative total quality of recovery and the presence of other diseases.

Table (7): Correlation between postoperative total quality of recovery and patients' age, body mass index, surgery duration and time of postoperative assessment

Items	Test/P value	Physical comfort	Emotional status	Pain	Patient support	Physical independence	Total Quality of recovery
Age	Pearson Correlation	-0.361*	-0.059	0.176	-0.064	0.072	0.061
	P Value	0.000	0.558	0.081	0.525	0.475	0.545
BMI	Pearson Correlation	-0.054	-0.017	0.020	0.185	-0.055	0.007
	P Value	0.594	0.867	0.845	0.066	0.587	0.943
Surgery duration	Pearson Correlation	-0.388*	-0.018	-0.174	-0.034	-0.253*	-0.156
	P Value	0.000	0.859	0.083	0.739	0.011	0.121
Time of postoperative assessment	Pearson Correlation	0.431*	0.711*	-0.407*	-0.339*	0.655*	0.500*
	P Value	0.002	0.000	0.000	0.001	0.000	0.000

**p≤ 0.001 highly significant*

Table 7 shows that, there was negative correlation between patients' age and physical comfort and there was negative correlation between surgery duration and both physical comfort and physical independence category. Also, there was negative correlation between time of postoperative assessment and both pain and patients' support. While, there was positive correlations between time of postoperative assessment and patients' physical comfort, emotional status, physical independence and total quality of recovery postoperatively for patients under study.

Table (8): Correlation between postoperative patients' quality of recovery domains

Quality of recovery categories	Test/ P value	Emotional status	Pain	Patient support	Physical independence
Physical comfort	Pearson Correlation	0.579*	0.744*	0.170	0.064
	P Value	0.000	0.000	0.090	0.529
Emotional status	Pearson Correlation	---	0.477*	0.313*	-0.050
	P Value		0.000	0.002	0.622
Pain	Pearson Correlation	---	---	0.117	0.098
	P Value			0 .248	0.330
Patient support	Pearson Correlation	---	---	---	0.121
	P Value				0.231

**p≤ 0.001 highly significant*

Table 8 shows that, there were only positive correlation between physical comfort and emotional status, between physical comfort and pain, between emotional status and pain and finally between emotional status and patient support.

IV. Discussion

Recovery from surgery and anesthesia is a continual process that requires the nurse to assess the patient in all its phases. Postoperative recovery is complete when function is restored and adverse symptoms have resolved. The recovery of health and function means different things to different people. This may be because they have had different operations, but it may also be because different things constitute health and function. So that it is important to assess the quality of recovery after surgery from patient's perspectives. The quality of recovery may be influenced in different ways. Understanding factors affecting post-operative recovery is of great importance of efforts to reduce morbidity and mortality after surgery. This study was conducted to assess the predictive factors affecting postoperative quality of recovery for patients undergoing surgery [4].

The present study revealed that the mean age of patients under study was 45.39 ± 15.65 and their age ranged from 18-80 years and two thirds of them were males and one third were females. These results are in agreement with Stark, Myles and Burke, (2013) [7] who stated that the mean age of patients evaluated postoperatively were 56 ± 16 that ranged from 18-85 years, and more than two thirds of them were males.

The findings of the present study revealed that three quarters of patients under study were married and one third of them were housewife, more than two fifths of them had mental work and one quarter of them had physical work. This result is in accordance with Berg, Kjellgren, Unosson, & Årestedt, (2012) [18] who stated that more than two thirds of patients were employed, but is contradicted with Yaghoobi et al, (2015) [16] who mentioned that more than half of patients under study were divorced or widowed. The results revealed that half of patients were educated (21% secondary, 29% bachelor), while the others were illiterate or read and write. This result is agreed with Berg et al, (2012) [18] who mentioned that more than two thirds of patients under study were up to secondary school level.

The present study showed that, more than half of the studied patients live in rural area, and the mean of patients' body mass index was 29.109 ± 5.37 that ranged from 16.42-44.81. This may be because El-Demerdash hospital is a governmental educational hospital that provides treatment with low cost and most of patients who receive treatment in this hospital are from low socio-economic standard who live mainly in rural areas. These results are contradicted with Yaghoobi et al, (2015) [16] who stated that nearly three quarters of patients were from urban areas, while one quarter from rural, and the mean of BMI of patients was 27.14 ± 15.56.

In relation to the present surgical history of patients under study, the study results revealed that nearly half of the studied patients were undergoing general surgery, one fifths were undergoing orthopedic surgery, less than one fifth had urological surgery and less than one fifth had ophthalmology and ENT surgery. This may be attributed to that the researchers choose different types of surgery because it may be considered one of the predictive factors that may affect the postoperative quality of recovery. This result is in the same line with Stark et al, (2013) [7] who choose different types of surgery that included cardiothoracic surgery, general surgery, orthopedic, neurosurgical, vascular, plastics, ENT or facio-maxillary and urologic surgery in their study that titled "Development and psychometric evaluation of a postoperative quality of recovery score".

Regarding the surgery duration, approximately two fifths of patients, their surgery last for 2-4 hours and less than two fifths of them, their surgery lasts for less than 2 hours. This result is in agreement with Moro, da Silva, Couri, Issa, and Barbieri, (2016) [19] who reported that the average length of the procedures was 171 min. While, concerning the time of postoperative assessment of patients, more than half of patients were assessed by the researchers postoperatively within 1-2 days of surgery and the mean time of assessment for all patients was 1.95±2.04 days that ranged from 1-10 days postoperatively. This result is in accordance with Stark et al, (2013) who mentioned that the mean time of assessment was 26 hours after surgery that ranged from 22-49 hours (26 ±4.8).

Identifying patients at postoperative risk in advance seems beneficial. The identification work can be done by nurses through preoperative screening or a pre-admission appointment, and the support may consist of preoperative education or a close postoperative follow-up at which the management of pain or other clinical management and self-care are advised [20]. Also, better preparation of patients for their recovery preoperative information, screening of patients and information are suggested to be priority interventions for surgery nurses [21].

The present study showed that majority of the studied patients had unsatisfactory knowledge regarding postoperative problems and the recovery process. This may be because patients didn't receive any awareness or instructions from health care members regarding the recovery process and the problems that may present during the postoperative period as a result of surgery and anesthesia. This may be attributed to that the health care members either nurses or physicians didn't have time to provide instructions for patients due to shortage of staff or overload with activities during their working hours in El-Demerdash hospital.

Concerning patients' knowledge regarding postoperative problems and the recovery process and its effect on patients' postoperative quality of recovery, the current study revealed that, there was a statistically positive correlation between them. This was emphasized by Berg, Årestedt and Kjellgren, (2013) [22] who stated that the patients need knowledge and understanding concerning what constitutes the normal range in recovery and how to manage self-care following their specific surgical procedure to attain a patient-centered approach and to enable them to successfully manage their recovery, psychosocial aspects have to be taken into account.

The results of the current study revealed that, about one fifth of the studied patients had poor QoR in the physical comfort category and about one third of them had poor physical independence. This may be because the time of postoperative assessment was performed for the patients in the first or the second day and the majority of them were undergoing general anesthesia. While, near two thirds of studied patients had excellent patient support. This emphasized that patients received acceptable emotional and psychological support from hospital staff, nurses, doctors, family members and friends in this critical time. This result is in agreement with Brattwall, et al, (2011) [21] who stated that physical comfort score improved 3 months after surgery.

Moreover, regarding postoperative total quality of recovery, only six patients had poor postoperative total quality of recovery. This may be due to that studied patients involved nine patients who were undergoing major surgery that last for more than six hours. While, about one fifth of them had an excellent total quality of recovery which may be because the time of postoperative assessment was more than five days from the date of surgery in about one fifth of the studied patients.

When the physical comfort improved, it consequently improves emotional status, this was proved in the current study, where the results showed that there was positive correlation between physical comfort and emotional status. Also, when the patients suffering from pain especially in early period postoperatively, this will affect negatively on patients physical comfort and emotional status, this was proved in the current study, where the results revealed that, there was positive correlation between physical comfort and pain and between emotional status and pain. Moreover, the results of the present study showed that, there was positive correlation between emotional status and patient support, where increasing patients' support will improve patients' mood and psychological status and consequently will affect positively on patients' emotional status.

Postoperative pain has been assessed in various studies as a significant morbidity to patient outcome. Uncontrolled postoperative pain is associated with psychological or cognitive dysfunction, fatigue, delirium, sleep disturbance and the risk of cardiovascular dysfunction [3]. The finding of the present study showed that approximately two thirds of patients (37% excellent, 23% good) under study had an excellent and good quality of recovery respectively in the pain category; in addition the pain category achieved the second higher score in the total QoR after patient support category. This may be attributed to that there is a good management and control of pain by physicians for patients undergoing surgery which lead to good patient satisfaction regarding this issue. Moreover, the study also revealed positive correlation between physical comfort and pain and between emotional status and pain. This mean that postoperative pain control by different methods both by analgesics or patient's support can alleviate pain and improve QoR and emotional status of patients, increase patients' comfort which can help patients to return to normal activities and reduce the complications that may be arise from poor pain control.

Regarding predictive factors that may affect quality of recovery postoperatively, the present study revealed that, there were highly statistically significant relation between postoperative total quality of recovery and patients' gender, where female patients showed higher mean score of quality of recovery than males. This result is contradicted with Buchanan and Myles, (2009) [23] who observed that female patients were more likely to have poor quality of recovery after anesthesia due to a higher incidence of nausea and vomiting among female patients or greater willingness to report dissatisfaction during the postoperative period. Also Chinedu, (2010) [24] showed higher postoperative complications of nausea, headache and back pain in their 180 female patients versus the 200 male patients after standard general anaesthesia. Moreover, Berg et al, (2012) [18] reported the presence of a negative association between female patients and low QoR-9 scores. While the result is agreed with Moro et al, (2016) [19] who stated that male gender was considered as a predictive factor for lower score in the QoR-40 questionnaire.

Regarding the relation between the postoperative total quality of recovery and type of anesthesia, the findings of this study showed that, there was no statistically significant relation between postoperative total quality of recovery and type of anesthesia. This may be due to that the majority of studied patients undergoing general anesthesia, while few only had epidural anesthesia. The unequal sample size of patients under each type of anesthesia may limit the ability to detect small differences. This result are contradicted with Fleisher, Pasternak and Lyles, (2007) [25] who mentioned that general anaesthesia is a postoperative risk following surgery, but its importance as a risk factor ought to be interpreted with caution. Also Berg et al, (2010) [26] found that patient characteristics as type of anaesthesia are factors affecting postoperative recovery. While

Carolina, Sousa, Santos, Santos and Abelha, (2015) [27] stated that QoR-15 scores were higher after general anesthesia.

Concerning the relation between postoperative total quality of recovery and type of surgery, the present study revealed that, there was statistically significant relation between postoperative total quality of recovery and type of surgery, where patients who were undergoing general surgery had better quality of recovery, followed by urological surgery. While those who had orthopedic surgery achieve lower postoperative QoR-score. This result is in accordance with Berg et al, (2012) [18] who found that the orthopaedic patients had a significantly lower postoperative recovery score. When mean changes in scores were compared between the surgical groups, a significant difference was shown initially at days 1-7. This may be due to orthopaedic surgery is painful and frequently has an effect on mobility, which often results in a protracted recovery period [26].

In addition, Moro, et al (2016) [19] added that Lower limb orthopedic surgeries are commonly performed under spinal anesthesia and accompanied by some postoperative peculiarities that deserve attention, such as ambulation limited by surgery or disease, dependence on support from others for basic activities, pain, urinary retention, and other possible adverse effects related to anesthesia and surgery and affect quality of recovery.

The present study revealed that there was statistically significant relation between postoperative total quality of recovery and the presence of other disease. Patients who are free from any other diseases had higher mean score of postoperative quality of recovery than those who had with other diseases such as hypertension, diabetes and hepatitis. This result is agreed with Carolina et al, (2015) [27] who emphasized that patients who had more frequently diabetes mellitus and hypertension and more frequently took antidepressant drugs and those with COPD were developed poor quality of recovery score after surgery.

Patient characteristics as age-related factor affect on quality of postoperative recovery. It is possible that the younger patients experienced a more rapid recovery process and were back in their ordinary life [26]. This is in the same line with the findings of the present study that showed, there was negative correlation between patients' age and physical comfort category. This means that younger patients had better score of QoR than older patients. While, this result is in contradicted with Carolina et al, (2015) [27] who mentioned that there was no relation between QoR-15 24 hours after anesthesia score and patient's age.

Concerning patients' characteristics such as body mass index, the results of the present study showed that, there was no statistically significant correlation between postoperative total quality of recovery and patients' body mass index. This is contradicted with Berg et al, (2010) who found that, patient characteristics as body mass index are factor affecting negatively on postoperative recovery and higher age, female sex, and higher BMI were all independent risk factors for delayed functional recovery.

The current study proved that, there was negative correlation between surgery duration and both, the physical comfort and physical independence. This may be due to the short period of time in which the patients were under anesthesia supposed to have more physical comfort. Additionally, the current study results revealed that, there was a positive correlation between time of postoperative assessment and the patients' physical comfort, emotional status, physical independence and postoperative total patients' quality of recovery. This may be due to the decrease pain with increasing the postoperative time which consequently affect positively on the patients' condition and increasing patients' physical comfort, improving emotional status, and also improving physical independence and postoperative total patients' quality of recovery.

V. Conclusion

The results of this study concluded that few patients had poor QoR, approximately two fifths had acceptable QoR, more than two thirds of them had good quality of recovery and one fifth had excellent quality of recovery postoperatively. Also, there are several predictive factors affecting the postoperative quality of recovery for patients undergoing surgery such as patient's gender, age, type of surgery, duration of surgery, presence of other diseases, as well as pain control.

VI. Recommendations

- It is recommended to use the postoperative QoR-40 score to assess the post operative quality of recovery for patients undergoing surgery in order to early recognize any problems and provide appropriate nursing management, reduce length of stay in hospital, as well as prevent or decrease complications.
- Conducting comprehensive patients assessment pre and postoperative in order to identify any factors may affect the quality of recovery of patients undergoing surgery.
- It is recommended to apply instructional sessions for patients undergoing surgery in the preoperative phase to raise their awareness regarding postoperative quality of recovery and postoperative problems.

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