

Enhancement Recovery after Traumatic Surgery Program Implementation on Nurses' Performance and Outcomes of patients

Dalia Ali Ameen ⁽¹⁾ & ⁽²⁾ Mabrouka Ahmed Abdellah & ⁽³⁾ Dina Mohamed Maarouf

(1), (3) Assistant Professor of Critical Care & Emergency Nursing, Faculty of Nursing, Ain Shams University, Egypt

(2) lecturer of Critical Care & Emergency Nursing, Faculty of Nursing, Ain Shams University, Egypt

Abstract

Background: Enhanced recovery after surgery (ERAS) programs have been developed to improve patient outcomes, hasten recovery after surgery, and lessen healthcare costs. ERAS programs are a multimodal approach, with interventions during all stages of care. **Aim:** Evaluate the effect of enhancement recovery after traumatic surgery program implementation on nurses' performance and outcomes of patients. **Design:** A quasi-experimental design (control & study group) for the studied patients and (pre-posttest) for the studied nurses was utilized to meet the aim of the study. **Setting:** This study was conducted in emergency department, general surgery operating theater and surgical ICU affiliated to El-Demerdash Hospital affiliated to Ain Shams University, Cairo, Egypt. **Subjects:** A convenient sample of all available nurses (68) will be recruited in the present study from the above-mentioned setting; (21 nurse from emergency department, 19 from the operating theatre and 28 from the surgical intensive care unit). Also, A purposive sample of 40 patients from the previous mentioned setting. **Tools:** **Tool I-** Nurses' designed assessment questionnaire, **Tool II-** Nurses' Observational checklist & **Tool III-** Patients' outcomes assessment tool. **Results:** showed that there was an obvious statistically significant improvement in the studied nurses' satisfactory level in the three different setting post program implementation, in addition to there was statistically significant improvement in patients' outcomes in the study group rather than the control group at $p < 0.05$. **Conclusion:** In view of the findings, enhancement recovery after traumatic surgery program implementation resulted in significant improvement in nurses' knowledge and practical level in the different study setting. Furthermore, there was positive statistically significance difference between the control and study group of patient's outcomes except for mortality rate. **Recommendations:** Availability of nursing interventional booklet regard enhancement after traumatic surgery is essential.

Keywords: Enhancement Recovery after Traumatic Surgery, Nurses' Performance, Outcomes of patients

Introduction

Enhanced Recovery after Surgery (ERAS) is a multimodal, multidisciplinary approach to boost the postsurgical recovery process through preoperative, intra operative, and postoperative interventions to accelerate patient recovery after surgery. The goal of ERAS is to lessen the surgical stress response while enhancing the recovery of physical functions, ultimately increasing cost-efficiency without compromising the quality of care. The implementation of such a protocol is a multidisciplinary effort involving surgery, anesthesia, nursing, and other disciplines (TONG et al., 2020).

ERAS programs have been developed worldwide with the aim of reducing perioperative stress, improving pain management, gut dysfunction, and lessening postoperative complications which will then lead to hastened patient recovery and decreased time in hospital

stay. Since the early 1990s, ERAS programs have been shown to significantly improve the quality of patient care after surgery leading to reductions in hospital length of stay and patient morbidity, as well as benefiting resource utilization (Gotlib et al., 2015).

Recently the pre-operative period has been the goal of a number of strategies to improve clinical outcomes. Innovation of technology in the surgical setting is also giving opportunities to overcome the challenges within ERAS, e.g., the usage of wearable activity monitors to record information and provide feedback and inspiration to patients peri-operatively. Both modernizing ERAS and given that evidence for key strategies through specialties will ultimately lead to better, more reliable patient outcomes (Abeles et al., 2017).

Critical care nurse accountabilities in the emergency department, operating theater and the

intensive care unit consist of evaluating a patient's condition and administering treatment, as well providing continuous support throughout recovery time. Nurses play a unique role in the implementation of enhancement recovery after traumatic surgery program to improve patient's outcomes (Wainwright, 2021).

Significant of study

Road traffic injuries are the leading cause of death. Road traffic crashes kill 1.2 million people annually around the world (3242 people a day), 90% of these deaths are in low- or middle-income countries (World Health Organization, 2023). According to the statistic of El-Demerdash hospital in 2022, there were 1100 patients had traumatic surgeries. Due to the increased complexity in healthcare and with the struggle to improve the quality of care and safety of patients, many healthcare organizations strive to boost quality care improvement through implementation of enhancement recovery after traumatic surgery program. The American Association for the Surgery of Trauma is committed to improve the care of the injured patient through education and research.

Aim of the work

Evaluate the effect of enhancement recovery after traumatic surgery program implementation on nurses' performance and outcomes of patients through the following:

1. Assessing nurses' knowledge & practice pre-enhancement recovery after traumatic surgery program implementation.
2. Assessing outcomes of patient's (control group) pre-enhancement recovery after traumatic surgery program implementation.
3. Implementing enhancement recovery after traumatic surgery program.
4. Assessing nurses' knowledge & practice post enhancement recovery after traumatic surgery program implementation.
5. Assessing outcomes of patient's (study group) post-enhancement recovery after traumatic surgery program implementation.

Research Hypotheses

Implementations of enhancement recovery after traumatic surgery program will have a significant improvement for:

1. Nurses' knowledge regarding enhancement recovery after traumatic surgery.
2. Nurses' practice regarding enhancement recovery after traumatic surgery
3. Outcomes of patients in the study group after traumatic surgery.

Subject & Method

Study design: A quasi-experimental design (control & study group) for the studied patients and (pre-posttest) for the studied nurses was utilized to achieve the aim of the study.

Setting:

This study was implemented in emergency department, general surgery operating theater and surgical ICU affiliated to El-Demerdash Hospital affiliated to Ain Shams University, Cairo. Egypt.

Subjects:

A convenient sample of all available nurses (68) was recruited in the present study from the above-mentioned setting; (21 nurses from emergency department, 19 from the general surgery operating theatre and 28 from the surgical intensive care unit).

Also, A purposive sample of 40 patients from the previous mentioned setting based on the following criteria.

Adult patients newly admitted with abdominal trauma from both gender regardless of their conscious level free from head trauma and chronic disease (diabetes mellites, peripheral vascular disease, immunological disease and cancer) were recruited to this study from the previous mentioned setting. The studied patients were divided into two groups: the control group (24 patients) whom received their routine care starting from the emergency room till discharge from the ICU, and the study group (24 patients) whom received the nursing care post-enhancement recovery after traumatic surgery program implementation.

Sample size

A sample size of (48) patients' needs to be recruited to achieve confidence level 90%. The sample size was calculated by adjusting the power of the test to 80% and the confidence interval to

90% with margin of error accepted adjusted to 5% using the following equation:

Type I error (α) = 0.05

Type II error (β) = 0.2

With power of test 0.80

Tools of data collection:

Tool I- Nurses' designed assessment questionnaire: It will be designed by the researchers based on reviewing recent related literatures (Ljungqvist et al., 2020; Memtsoudis et al., 2019 & Geltzeiler, et al., 2014) and it included two parts:

Part A: Nurses Demographic Characteristics:

It involved age, sex, educational Level, years of experience and previous training courses.

Part B: Nurses Knowledge assessment sheet:

It used to assess nurses' knowledge regarding enhancement recovery after traumatic surgery included three parts; **part (1) Pre operative phase** that encompassed 24 MCQ questions regarding ABCDE assessment and safe transfer. ABCDE assessment; A for airway, B for breathing, C for circulation, D for disability and E for exposure, **part (2) Intra operative phase** included 21 MCQ questions regarding Surgical safety measures, antibiotic prophylaxis, maintenance of normothermic and fluid management, **part (3) Post operative phase** encompassed 31 MCQ questions regarding Airway management, pain management, nutritional needs assessment, surgical site assessment and early mobilization.

Scoring system: The correct answer of nurses' knowledge scored by one, while the incorrect answer scored by zero. Total score for **pre operative phase** was 24 marks, and it considered that: $\geq 95\%$ (≥ 22.8 marks) was satisfactory while $< 95\%$ (< 22.8 marks) was unsatisfactory. Total score for **intra operative phase** was 21 marks, and it considered that: $\geq 95\%$ (≥ 19.9 marks) was satisfactory while $< 95\%$ (< 19.9 marks) was unsatisfactory. Total score for **post operative phase** was 31 marks, and it considered that: $\geq 95\%$ (≥ 29.4 marks) was satisfactory while $< 95\%$ (< 29.4 marks) was unsatisfactory

Tool II- Nurses' Observational checklist: It used by the researchers after reviewing recent related literature (Gotlib et al., 2015; Thiele

et al., 2015; Shang & Zhang 2018; Ahmed & Mahmoud 2019; Ali et al., 2019 & TONG et., al 2020). It included **Pre operative assessment checklist (21 steps)** included Primary survey thorough ABCDE assessment (17 steps and safe transfer (four steps), **Intra operative assessment checklist (35 steps)** involved Surgical safety checklist which adapted from (WHO Surgical Safety checklist, 2008) and included three main parts; 1st part before induction of anaesthesia (seven steps), 2nd part before skin incision (six steps) and 3rd part before patients leaving operating room (five steps), Antibiotic prophylaxis (four steps), Maintenance of normothermic (three steps) and fluid management checklist (10 steps). **Post operative assessment checklist (51 steps)** included Airway management (seven steps), Pain management (five steps), Nutritional needs management (six steps), Surgical site assessment (12 steps) and Early mobilization (21).

Scoring system: The correct answer of nurses' knowledge scored by one, while the incorrect answer scored by zero. Total score for **pre operative phase** was 21 marks, and it considered that: $\geq 95\%$ (≥ 19.9 marks) was satisfactory while $< 95\%$ (< 19.9 marks) was unsatisfactory. **for intra operative phase** was 35 marks, and it considered that: $\geq 95\%$ (≥ 33.2 marks) was satisfactory while $< 95\%$ (< 33.2 marks) was unsatisfactory. For **post operative phase** was 51 marks, and it considered that: $\geq 95\%$ (≥ 48.4 marks) was satisfactory while $< 95\%$ (< 48.4 marks) was unsatisfactory

Tool III- Patients' outcomes assessment tool:

This tool will be settled by the researcher for the patients in study and control groups. It included three parts divided as following:

Part A: Patient demographic characteristics: it included age and gender.

Part B: Patients' medical data: it concerned with assessment of patients' medical data that included diagnosis and past history of patients.

Part C: Patients' outcomes assessment record: this part will be collected by the researchers included hydration status, occurrence of

surgical site infection, chest infection, deep venous thrombosis, length of stay and mortality rate. Hydration status of the patients was assessed by obtaining their CVP, intake, output, skin turgor and capillary refill time. For occurrence of surgical site infection; color, length, depth and drainage of the wound were recorded. Occurrence of chest infection was assessed by obtaining patient temperature, amount, odor and color of secretions, frequency and severity of cough, degree of tachypnea or shortness of breath, changes in chest x ray finding, CBC results and pulse oximetry or ABG results to measure oxygen the blood. Deep venous thrombosis occurrence was assessed through checking for pain, temperature of both legs, redness, pitting edema, tenderness around the suspected area and contrast venography.

- **Validity & Reliability: Content validity;** the revision of all the study tools done by a panel of five expertise's (three professors and two assistant professors in critical care and emergency nursing- at Faculty of Nursing-Ain Shams University) to evaluate the content validity of the tools and modifications were done.
- **The reliability;** was tested for the tool I, II & III by using alpha Cronbach's test (0.765, 0.954 and 0.875 respectively), those values indicated moderate to high reliability of the used tool.

Pilot study: It was conducted on 10% of the studied sample (seven nurses) and (five patients) from the previous mentioned settings to evaluate the applicability of the tools and to estimate the time needed to fill the tools. There wasn't any modification done so, the nurses and patients in the pilot study were included in the study.

Field work:

- The Field work passed by assessment, planning, implementation & evaluation phase within five months started from October 2023 to February 2024.

Assessment phase

- To conduct this study, an ethical approval was obtained from scientific research ethics committee, faculty of nursing -Ain Shams

University, Cairo, Egypt under study number (23.10.149).

- The researchers interviewed the studied nurses in the previous mentioned settings after received their agreement to participate in the study and purpose of the study was explained to them.
- The data collection during this phase took about (10 weeks). The researchers visited the selected previous mentioned settings five days per week at morning and afternoon shift waiting for admission of patients with abdominal trauma to the emergency department. A convenience sample of all available nurses 68 nurses; 22 from the emergency department, 19 from the general surgery operating theater and 27 from the surgical intensive care unit were involved in the study.
- **The practice observational checklist (tool II)** was used prior to administration of the knowledge assessment questionnaire (tool I) to ensure the maximal realistic observations of the nurses' practice and minimize the possibility of contamination. Each nurse in the emergency department, the operating theater and the surgical intensive care unit was observed by the researchers while caring for the same patients through their work within the shifts. The 68 nurses took about eight weeks to be observed by the researchers. Then, **knowledge assessment questionnaire (tool I)**, part 1 concerned with pre operative phase assessment was administered to the studied nurses in the emergency department, part 2 concerned with intra operative phase assessment was given to the studied nurses in the operating theater and part 3 concerned with the post operative phase assessment was given to the studied nurses in the intensive care unit. The studied nurses in the different setting received the questionnaire assessment tool individually in their shifts and filled in by each one to assess nurses' level of knowledge regarding enhancement recovery after traumatic surgery; it took about 20-25 minutes to be filled by the studied nurses with total two weeks to complete the tool.
- A purposive sample of 24 patients were recruited as a control group pre the enhancement recovery after traumatic surgery

program implementation for assessing their outcomes using tool (III) part A & B which were filled in by the researchers for each patient from their medical records and by observing them, it took about 30 minutes.

Planning phase:

Based on the approach of enhancement recovery after traumatic surgery, the researchers designed a booklet regarding enhancement recovery after surgery in an Arabic language to be suitable for all nurses regardless to their educational level. The booklet was consisted of the following three parts; Part (1) pre operative nursing care for trauma patient including the primary survey. Part (2) intra-operative nursing care including surgical safety checklist, antibiotic prophylaxis, maintenance of normothermic and optimize fluid management. Part (3) post operative nursing care, including airway management, pain management, nutritional needs management, surgical site assessment and early mobilization.

Implementation phase

The data collection during this phase took about (two weeks). Each researcher was responsible for one setting for enhancement recovery after surgery program implementation for the studied nurses. The researcher in each setting divided the nurses into four groups, each group consisted of four to six nurses. Each group received five sessions after the morning shift and before the afternoon shift; part (1) was administered within one session, part (2) two sessions and part (3) two sessions. The time of each session ranged from 60-90 minutes before beginning or after of their shifts. The sessions were given through demonstration, re-demonstration, group discussion, role play and videos to provide the studied nurses with the updated knowledge and practice regarding enhancement recovery after surgery. The manual booklet was given to each nurse participated in the study,

Evaluation phase:

The data collection during this phase took about (8 weeks). Nurses' knowledge and practice were evaluated post enhancement recovery after surgery program implementation by the researchers using Tool (I) (Part 1 & 2) and Tool (II). The studied group of patients (24

patients) were evaluated regarding their outcomes using Tool (III). Evaluating the effect of the program implementation on nurses' performance and patients' outcomes were done by comparing the related results pre and post the enhancement recovery after surgery program implementation.

Statistical analysis:

The data collected had reviewed, coded, analyzed and tabulated. Descriptive statistics (frequencies and percentages, mean and standard deviation) were done using computer program (SPSS) version (26). Chi-square test used in the relationship between pre and post nurses' knowledge and practice. Chi-square test used also comparing the outcomes between the control and the study. Pearson correlation coefficient is used for quantitative variables (knowledge & practice). It's considered significant when P value less than (0.05).

Results:

Result in **table (1)** showed that, the mean age of the studied nurses in the emergency department, operating theater and the surgical intensive care unit was 29.8 ± 5.2 , 38.6 ± 6.4 and 27.7 ± 8.2 respectively. Obviously in the emergency department, operating theater and surgical ICU, (57.1%, 89.5 % & 67,9%) of the studied nurses were female. According to their educational level in the previous three mentioned setting, (57,2%) of the studied nurses had technical institute in the emergency department, (47.3%) of them had diploma degree in the operating theater while 50 % of them in the surgical intensive care unit had bachelor degree. As regard to their previous training sessions, (100%) did not receive any training sessions.

Table (2) clarified a comparison between the percentage distribution of the studied nurses' total satisfactory level of knowledge and practice pre, and post implementation of enhancement recovery after traumatic surgery program and it there was an obvious statistically significant improvement in their satisfactory levels in the three different setting post program implementation.

Table (3) revealed that there was no statistically significant difference control and study group of patients regarding their demographic data

Table (4) illustrated significant differences between the study and control group clinical outcomes regarding balanced hydration status, occurrence of surgical site infection, chest infection, deep venous thrombosis, length of stay and mortality rate at (X^2 5.423, $P= 0.021$), ($X^2 =5.979$, $P=0.000$) (X^2 4.544, $P= 0.023$), (X^2 5.213, $P= 0.049$), (X^2 6.880, $P= 0.009$) & (X^2 6.233, $P= 0.000$) respectively.

Table (5) clarified a positive correlation between total nurses' satisfactory level of knowledge and practice in emergency department, operating theater & surgical intensive care unit post implementation of enhancement recovery after traumatic surgery program ($r = 0.501$ at $P= 0.497$, $r=0.402$ at $P=0.002$ & $r=0.010$ at $p=0.001$) respectively.

Table (1): Frequency distribution of demographic characteristics of the studied nurses.

Items	Nurses in emergency department (N=21)		Nurses in operating theater (N=19)		Nurses in surgical intensive care unit (N=28)	
	N	%	N	%	N	%
Age group (years)						
18 < 30	13	61.9	4	21	16	57.1
30 < 40	6	28.6	6	31.6	8	28.6
40 ≤ 60	2	9.5	9	47.4	4	14.3
Mean±SD	Mean±SD 29.8 ±5.2		Mean±SD 38.6 ±6.4		Mean±SD 27.7 ±8.2	
Gender						
Female	12	57.1	17	89.5	19	67.9
Male	9	42.9	2	10.5	9	32.1
Educational level						
Diplome	2	9.5	9	47.3	3	10.7
Technical institute	12	57.2	6	31.6	10	35.7
Bachelor degree	7	33.3	4	21.1	14	50
Master/ PHD	---	---	----	----	1	3.6
Years of experience						
< 10	13	61.9	4	21.1	16	57.1
≥ 10	8	38.1	15	78.9	12	42.9
Previous training courses						
Yes	0	0	0	0	0	0
No	21	100	19	100	28	100

Table (2): Percentage distribution of total nurses' satisfactory level of knowledge & practice pre and post enhancement recovery after traumatic surgery implementation (no=68)

Total satisfactory level of Knowledge						
Items	Nurses in emergency department (N=21)		Nurses in operating theater (N=19)		Nurses in surgical intensive care unit (N=28)	
	No	%	No	%	No	%
Pre	6	28.6	2	10.5	8	28.5
Post	17	80.9	15	78.9	21	75
Test of significance	$X^2=6.833$ P value= 0.016		$X^2=8.217$ P value=0.015		$X^2=5.367$ P value=0.023	
Total satisfactory level of Practice						
	No	%	No	%	No	%
Pre	8	38	7	36.8	13	46.4
Post	18	85.7	16	84.2	23	82.1
Test of significance	$X^2= 7.367$ P value=0.042		$X^2=8.050$ P value=0.062		$X^2=6.214$ P value=0.024	

Table (3): Comparison between frequency distribution of Demographic data of control and study group of patients (n= 24 patients in each group).

Demographic data		Control group		Study group		X ²	P value
		N	%	N	%		
Age	18-<40	14	58.3	15	62.5	0.806	0.369
	40-<60	8	33.3	6	25	0.997	0.318
	>=60	2	8.3	3	12.5	0.563	0.293
Gender	Male	19	79.2	18	75	2.453	0.269
	Female	5	20.8	6	25	1.269	0.260

Table (4): Comparison between control and study group clinical outcomes of patients pre and post enhancement recovery after traumatic surgery program implementation (n= 24 patients in each group).

Clinical outcomes	Clinical outcomes of patients pre and post enhancement recover after traumatic surgery implementation					
	Control group		Study group		X ²	P value
	No	%	No	%		
Balanced Hydration status	13	54.2	21	87.5	5.423	0.021
Occurrence of surgical site infection	6	25	1	4.2	5.979	0.000
Occurrence of chest infection	7	29.2	2	8.3	4.544	0.023
Occurrence of deep venous thrombosis	3	12.5	0	0	5.213	0.049
Length of stay in ICU ≥ 3 days	10	41.7	3	12.5	6.880	0.009
Mortality rate	5	20.8	1	4.2	6.233	0.000

Table (5): Correlation between total nurses' satisfactory level of knowledge and practice pre & post enhancement recovery after traumatic surgery program implementation in the different settings.

Items	Total level of nurses' knowledge in the emergency department			
	Pre		Post	
	r	P-value	r	P-value
Total level of nurses' practice in the emergency department	0.435	0.001	0.501	0.0002
Total level of nurses' knowledge in the operating theater				
Total level of nurses' practice in the operating theater	0.082	0.326	0.497	0.010
Total level of nurses' knowledge in the intensive care unit				
Total level of nurses' practice in the intensive care unit	0.192	0.141	0.402	0.001

Discussion:

Lifelong learning, continuous education, staff development and in-service training for nurses are important to improve their competencies as required for the delivery of optimal care to the patients.

The present study revealed that, mean age of studied nurses in the emergency department was 29.8 ±5.2, with the majority of the studied nurses aged from 18 < 30 years. This finding

may be due to that the majority of studied nurses working in the emergency department were newly graduated and working in such hot areas need newly graduated who has the physical health that enables them to work in such areas. As regard age of studied nurses in the operating theater, the present study stated that near half of them their age ranged from 40 to less than or equal 60 years old. This data may be due to that operating theater need experience, so most of them are old. As regard age of studied nurses in the surgical intensive

care unit, the present study stated that more than half of them aged from 18 to less than or equal 30 years old. The surgical intensive care unit need more power and effort so most of the nurses working in such areas are newly graduated.

Concerning gender in the emergency department, the current study found that, more than half of the studied nurses were females. Also, the majority of nurses in the operating theater were female and more than two thirds of the studied nurses in the surgical intensive care unit were female. This result could be due to that of nursing profession in Egypt was previously included female only, moreover the male nurses travel for working outside the country for financial issues.

As regard to level of education, the present study represented that, more than half of the studied sample in the emergency department with technical institute degree. This result may be due to canceling of nursing school. Near half of the studied nurses in the operating theater were diploma nurses, this may be due to that near half of the studied nurse were aged from 40 to less or equal 60. In addition to, the present study revealed that half of the studied nurses in the intensive care unit had bachelor degree. These hot areas always in need to more knowledgeable and skillful nurses. As regard to training courses, the present study stated that all of the studied nurses in the different settings did not receive any training sessions. This may be due to nurses' disability to attend training courses because of workover load.

Regarding nurses' total satisfactory level of knowledge and practice pre, and post enhancement recovery after traumatic surgery program implementation in the emergency department, operating theater and intensive care unit, the present study stated that there was statistically significant improvement in their satisfactory levels post enhancement recovery after traumatic surgery program implementation. The studied nurses demonstrated a significant improvement compared to their pre level. The significantly improvement in the level of the studied nurses' performance (knowledge and practice post the nursing interventional enhancement program implementation might be related to that awareness of the majority of the

studied nurses had increased regarding their responsibilities toward enhancement recovery after traumatic surgery program implementation.

Significant improvement after program application could be due to that the program did not only stress on gaining knowledge but also stressed on practical training to attain information and enhance practice using suitable sessions, different teaching methods as group discussion, lecture, demonstration and re-demonstration, using media as handout including pictures and knowledge and also, availability of materials and videos required for accomplishment of the work. The theoretical and practical contents were administered to the studied nurses with explanations, strengthening and feedback. All studied nurses in the program was given a handout of the program content. Also, recurrent reinforcement for both knowledge and practice were done in each session. Comprehensive educational session regarding enhancement recovery after traumatic surgery program implementation should beheld regularly. An appropriate clinical guidelines and protocols should be developed for safe clinical practices and reducing morbidity and mortality rate.

The researcher's explained unsatisfactory level of knowledge and practice of nurses' pre-enhancement recovery after traumatic surgery program implementation that the nurses in the emergency department, operating theater and intensive care unit didn't get any training sessions. Therefore, lack of continuous training sessions contributes to the problem. Also, the majority of nurses in the emergency department and intensive care unit had experience less than 10 years. Also, more than half of the studied nurses in the emergency department were technical institute graduates and near half of the nurses in the operating theater were diploma.

As regard to demographic data of patients, the present study revealed that more than half of the study and control group of patients aged between 18 to less than 40 years old with mean age of 29 ± 9.1 . This result not in accordance with **Gillissen, et al., (2015)** in their study regarding "Sustainability of an Enhanced Recovery after Surgery Program (ERAS) in Colonic Surgery" who stated the mean age of the patients were 64. Also, **Ripollés et al., (2019)** in

their study entitled “Association between use of enhanced recovery after surgery protocol and postoperative complications in colorectal surgery: the postoperative outcomes within enhanced recovery after surgery protocol (POWER) study” stated that mean age of their studied patients was 68 years. According to their gender, more than three quarters of them were male. This result goes in the same line with **Bona, et al., (2014)** in the study titled “Introducing an enhanced recovery after surgery program in colorectal surgery: a single center experience”, who found that 79% of the studied patients were male.

In relation to comparison between control and study group clinical outcomes of patients pre and post enhancement recovery after traumatic surgery program implementation, the present study stated significant differences between the study and control group clinical outcomes regarding balanced hydration status, occurrence of surgical site infection, chest infection, deep venous thrombosis, length of stay and mortality rate.

Experts are calling for enhancement recovery after traumatic surgery program implementation as a standard of care for every ICU patient. Significant balanced hydration status, occurrence of surgical site infection, chest infection, deep venous thrombosis, length of stay and mortality rate, a finding that is supported in the literature that the enhancement recovery after traumatic surgery program implementation reduce the length of hospital stay, rate of complications and mortality rate. These findings are consistent with other studies that also noticed a decrease in hospital length of stay and postoperative complication rates.

The study results go in the same line with **Liu et al., (2017)** in study titled “Enhanced Recovery After Surgery Program Implementation in 2 Surgical Populations in an Integrated Health Care Delivery System”, and stated that implementation of the enhancement recovery after surgery program (ERAS), was associated with favorable reductions in hospital length of stay and postoperative complication rates. Among patients undergoing colorectal resection, ERAS implementation was associated with decreased rates of hospital mortality (0.17; 95% CI, 0.03-0.86; P = .03) and major

complications (0.28; 95% CI, 0.12-0.68; P = .005). Among patients undergoing hip fracture repair, implementation was associated with an increased rate of discharge to home (1.24; 95% CI, 1.06-1.44; P = .007).

Ljungqvist, et al., (2017) in their study about “Enhanced recovery after surgery” showed that implementation of the Enhanced Recovery After Surgery protocols have resulted in shorter length of hospital stay by 30% to 50% and similar reductions in complications, while readmissions and costs are reduced. Also, **Bona, et al., (2014)** in their study regarding “Introducing an enhanced recovery after surgery program in colorectal surgery: a single center experience” confirmed that introduction of an ERAS protocol for colorectal surgery allows quicker postoperative recovery and shortens the length of stay compared to historical series. The compliance to the ERAS protocol application resulted in enhanced recovery and a decrease in hospital length of stay (LOS) from a median of 9 days at baseline to 6 days at one-year follow-up. In addition to **Ripollés et al., (2019)** revealed that the number of patients with moderate or severe complications was lower in the ERAS group with odds ratio [OR], 0.77; 95% CI, 0.63-0.94; P = .01).

As regard to correlation between total nurses’ satisfactory level of knowledge and practice post enhancement recovery after traumatic surgery program implementation. The study result outlined a positive correlation between nurses’ knowledge and practice in the different study settings. The researchers ascribed this improvement because of the program application using attractive media, simulation techniques, demonstration and re-demonstration that positively affected on their knowledge, and subsequent their practice and favorable patients’ outcomes. The knowledge is necessary for nurses to improve their practice. Nursing knowledge production must also be viewed in conjunction with practice as practice invades gaining of knowledge. Nursing competencies depend largely on intuitive knowledge and skills. Therefore, the reasons for nurses, improper performance are usually the lack of nurses’ knowledge and skills.

Conclusion:

In view of the findings, enhancement recovery after traumatic surgery program implementation resulted in significant improvement in nurses' knowledge and practical level in the different study setting. Furthermore, there was positive statistically significance difference between the control and study group of patient's outcomes except for mortality rate.

Recommendations:

- Further research regard enhancement recovery after traumatic surgery program is suggested for nurses to upgrade their knowledge and enhance their practice.
- Availability of nursing interventional booklet regard enhancement after traumatic surgery is essential.

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