Implementing Enhanced Recovery Pathway after Surgery Protocol for Women Undergoing Cesarean Section Delivery

Afaf Mohamed Mohamed Emam[(1)]& Eman Mohamed Abd Elhakm[(2)], Nageya Ezzat Said [(3)]

(1,2) Asisstant Professor of Obstetrics & Gynecological Nursing, Faculty of Nursing, Benha University, Egypt
(3) Lecturer of Maternal and Neonatal Health Nursing, Faculty of Nursing, Ain Shams University, Egypt

Abstract

Background: Women experiencing cesarean section tend to have several problems, so assisting mothers in coping with and solving these problems as well as improving their practices may contribute to decreasing length of stay, reduce post operative complications and achieve early recovery. **Aim**: to investigate the effect of enhanced recovery pathway after surgery protocol for women undergoing cesarean section delivery. **Design**: A quasi-experimental design was used. **Setting:** The study was conducted at Obstetrics and Gynecological department of Benha University Hospital, Benha City, Egypt. **Sample:** Included two main samples: 1) A convenient sample of all maternity nurses (50) 2) A purposive sample of 200 women undergoing CS divided into two equal groups "100 woman were assigned to the study group who received (ERP) protocol and 100 woman were assigned to the control group who received routine postoperative care. **Tools**: Five tools were used 1) Self-administered questionnaire for nurses. 2) An observational checklist for nurses. 3) A structured interviewing questionnaire for the women 4) An observational checklist for the women 5) Visual Analogue Scale. **Results**: There was a highly statistically significant improvement in the total nurses' knowledge and practices after implementation of enhanced recovery passway after surgery (ERP) protocol compared to pre implementation. Also, its application following CS had an effect on improvement of post operative outcome for women as early oral intake, early ambulation, early initiated of breast feeding, less mean pain score, improvement immediately in the practices of mothers as well as decreasing the incidence of health problems in the post-operative period, shorter mean period for length of hospital stay and suture removal. **Conclusion**: implementation of enhanced recovery passway after surgery (ERP) protocol significantly improved the total knowledge and practices scores of maternity nurses' and significantly improved the postoperative outcome for women, reduce postoperative complications, especially pain, decrease length of stay, improving mother's performance related to breast feeding, early ambulation and post natal exercises. **Recommendation**: Enhanced recovery passway after surgery protocol should become the standard practices for all women undergoing cesarean section to improve postoperative outcomes and reduce postoperative complications.

Keywords: Enhanced, recovery pathway, surgery, protocol, cesarean delivery

Introduction:

Caesarean delivery is a surgical procedure in which incisions are made through woman's abdomen and uterus to give birth after 20 weeks of gestation. It is a life-saving procedure during a vaginal birth that is considered unsafe for the baby or the mother ***(Dhillon et al., 2020).*** Caesarean sections are one of the most common surgeries performed in the United States, with nearly 1.3 million cesarean sections performed each year, representing nearly one-third of all births ***(Murphy et al., 2017).*** The increasing global rates of CS have been one of the most debated topics in maternity care. CS is a major surgical procedure and like any surgical procedure, carries significant risks of morbidity and mortality. Therefore, an effective protocol must be established and implemented for CS to enhance recovery and improve maternal as well as neonatal outcomes ***(Naeem et al., 2019).***

Enhanced recovery passway after surgery (ERP) is a multidisciplinary perioperative care program that combines evidence- based practices, standardized approach to optimize and enhance patient recovery (***Scott et al., 2020).*** The goal of the (ERP) protocol is to reduce surgical stress and accelerate early physiological and functional recovery in the postoperative period**.** The interventions cover the entire spectrum of the surgical experience, including the preoperative, intraoperative and postoperative periods ***(Varadhan et al., 2019)***. Strategies of ERP protocol is the concept of improving recovery from the surgical catabolic and inflammatory response, with components such as minimizing preoperative fasting periods, proper perioperative hydration as well as nutrition, maintain normothermia, providing a preoperative carbohydrate load, early removal of the urinary catheter, avoid postoperative gastrointestinal

disturbance, providing standardized multimodal management of pain, and early mobilization and feeding postoperatively ***(Ljungqvist et al., 2017).***

Pathways to improve postoperative recovery have been developed with the goal of maintaining normal physiology throughout the perioperative period, thereby optimizing patient outcomes without increasing complications or recurrence after surgery. The goal of reducing surgical stress and helping the body to alleviate the consequences of such stress with ERP protocol achieved through the implementation of a combination of several factors that, when combined, form a complete perioperative management program ***(Reuter et al., 2021).***

An Enhanced Recovery Pathway (ERP) protocol's implementation is linked to a shorter length of stay, a reduction in postoperative complications rates, a decline in morbidity, cost reductions, and maintenance of patient satisfaction and life quality ***(Greco et al., 2019).*** ERP protocol is generally linked to decrease in pain scores due to the adoption of multimodal pain treatment strategies. Additionally, patients with an ERP recover faster to their pre-treatment functional status ***(Heeba et al., 2019).***

Nurses play a significant role and are crucial in delivering education, perioperative care, postoperative evaluation, and cost accounting. An ERP for surgical services was defined, designed, implemented, and audited by the implementation team. The role of the nurse is vital for education and the effective use of the pathways. Best practices for building ERPs demand consistency among the care team, diligence to verify compliance, and use of an assessment tool for quality improvement. ***(Karen et al., 2018).*** Enhanced recovery passway after surgery (ERP) implementation by healthcare professionals preserves continuity of care by encouraging consistency in evaluation and documentation and so reducing heterogeneity in practices. It equips the nurses caring for the mother with information based on evidence as well as references relevant to predicted typical findings and care techniques that indicate the mother is ready for discharge. For the nurse, deviations from the expected norm serve as crucial decision points for care alternatives and actions. ***(El Baz , 2018).***

Significance of the study

The caesarean rate has dramatically increased on a global scale, which currently exceeds 30%. More than half of all births in developing countries especially Egypt is now by CS, Egypt occupies the second place among the world countries in cesarean deliveries. A recent examination of health records on all deliveries in 13 public hospitals in four Egyptian capitals (Cairo, Alexandria, Assiut, and Behera) in April 2016 indicated average CS rates of 54.2 percent, varying from 22.9 to 94.3 percent between the different facilities***).*** CS has the same dangers as any other surgeries. Possible complications include excessive bleeding, infection, delayed recovery time after childbirth, delayed initiation of breastfeeding and skin-to-skin contact, and a higher risk of complications in subsequent pregnancies ***(Bollag et al., 2020).***

The ERP is an interdisciplinary, evidence-based strategy to improve clinical services throughout the perioperative period. The goal of ERP is to reduce the physiological responses during surgery to improve patient outcomes while reducing postoperative problems**.** The ERP Association guidelines were established to support the CS as it is the most common surgical operation in the advanced medical industry ***(Caughey et al., 2018)***. Moreover, to our knowledge, no studies were conducted on the effect of implementing ERP after surgery protocol for women undergoing cesarean section. From the researchers point of view implementing this intervention will assist health care providers and specialist nurses in providing a high quality of care based on facts from recent evidence, also the researchers hoped to overcome the existing gap in the continuity of care and reduce maternal morbidity and mortality.

Aim of the study:

The aim of the current study was to investigate the effect of enhanced recovery pathway after surgery protocol for women undergoing cesarean section delivery. The aim was achieved through:

1. Assessing nurses' knowledge and practices regarding ERP after surgery protocol pre intervention.
2. Assessing mother's knowledge regarding the post-cesarean section care pre intervention.
3. Designing and implementing (ERP) protocol for women undergoing cesarean delivery.
4. Evaluating the effect (ERP) protocol on maternity nurses knowledge and practices.
5. Evaluating the effect (ERP) protocol on women's knowledge regarding the post- cesarean section care, post-operative indicators, and postoperative complications.

Hypothesis:

H1- Maternity nurses will have higher knowledge and practices scores regarding ERP protocol after its application than before.

H2- Women undergoing cesarean delivery who received the ERP protocol will have higher knowledge scores regarding the post-cesarean section care than those who received the routine hospital care.

H3- Women undergoing cesarean delivery who received the ERP protocol will experience rapid improvement in post-operative indicators compared to who received routine hospital care.

H4- Women undergoing cesarean delivery who received an ERP protocol will experience fewer postoperative complications than those who

received routine hospital care.

Operational definition:

ERP: is a standardized, multidisciplinary preoperative care program to optimize and enhance postoperative recovery ***(Tamang et al., 2021).*** In the present study, it refers to the use of an evidenced- based system to improve maternal outcomes, functional recovery, maternal-infant bonding, and patient experiences through reducing the postoperative health problem as nausea and vomiting, early initiation of oral feeding, early ambulation, immediate control of postoperative pain, earlier return of bowel function and decreased the length of hospital stay among women who underwent CS. It was measured using an observational checklist regarding postoperative indicators during postpartum as vital signs, nausea, vomiting, urine retention, wound healing, constipation.

Subjects and Method

Research Design: A quasi-experimental research design (study and control group) was used to accomplish the study's objective. Quasi-experimental research design attempt to determine causal relationships by applying a treatment or condition to one group (intervention) and comparing the outcome with a control group. Quasi- experimental research is like experimental research in that there is manipulation of an independent variable. It necessitates that subjects are randomly assigned to the groups to avoid bias and it controls all extraneous variables and uses a broader array of data collection techniques and statistical analyses. ***(Crossman, 2019)***.

Setting: This study was conducted in obstetric and gynecological department at Benha University Hospital, Benha City, Egypt. The University Hospital has a key role in undergraduate education for healthcare professionals. It provides free and paid services during pregnancy, labor, postpartum and miscarriage. It also provides fertility treatment and gynecological care for public clients.

Sampling:

Sample type: Includes two main samples:

1. **Convenient sample** Include all nurses working in obstetric and gynecological department at Benha University Hospital (50) at time of data collection.

   It is a non-probability sample in which the researcher used the subjects that are nearest and available to participate in the study. ***(Crossman, 2019)***.

2. **A purposive sample** of 200 woman undergoing cesarean delivery was recruited in this study. Women were divided into two equal groups (100 were recruited in study group and received the post operative ERP protocol in addition to routine hospital care and 100 were recruited in control group and received the routine hospital care). According to the following **inclusion criteria:**

   1. Women undergoing elective cesarean delivery.
   2. Age between 20 and 35 years old
   3. Free from any pregnancy related complications.
   4. Free from any complications during operation.

Sample Size: For calculating the required sample size for women, the researchers used the Epi statistical program from the open-Source Statistics for Public Health. The assumptions were: a two-sided confidence level of 95% = 1- α; a power (1- β) or (% chance of detecting) of 80%; ratio of sample size, unexposed (control) / exposed (study group) = 1% of unexposed with outcome = 5%. Based on the given formula, the sample size required is 100 for each group.

Tools for data collection:

To accomplish the study aim and to distinguish the steps on which it was based, the study adopted five tools, as shown in the following.

Tool (I): Self-administered questionnaire for nurses. It was developed by the researchers after reviewing recent literature review ***(Abd El-Ati, et al., 2019).*** It included two main parts:

Part 1: It was concerned with the demographic characteristics of the studied nurses such as age, educational qualifications, years of experience, attendance of training courses related (ERP) protocol and duration since attendance of training courses. This part was assessed once before intervention.

Part 2: It contained questions to assess nurses' knowledge regarding ERP protocol of CS, this part was assessed twice before and after the intervention. It included questions such as definition, importance, components of ERP protocol for CS and the nurses' role in its application.

Scoring system of knowledge: A score of (2) was given for a correct and complete answer, a score of (1) for a correct but incomplete answer, and a score of (0) for an incorrect answer. The sum of the scores for each section's items was used to determine the section's overall score. The sum of the scores from each section was added to determine the participant's overall knowledge score. It was calculated to find the mean and standard deviation. Total knowledge score was classified as:

- Poor < 60%
- Average 60 % to 75%
- Good >75%.

Tool (II): An observational checklist for nurses (used twice before and after intervention): it was developed by the researchers after reviewing the related literature ***(Mostafa, 2019)*** to assess the nurses' practices regarding pre, intra, and post CS care before and after ERP protocol application. It consisted of 22 items related to the preoperative, intraoperative, post-operative pathway and 9 items practices related to the

newborn care before and after ERP after surgery protocol application.

Scoring system of practices: Each item was assigned a score of (2) for done correctly and score (1) for done incorrectly. The total score was calculated by summation of the scores of its items. The total score of practices was calculated by the addition of the total score of all sections. The total score practices: The total score was categorized into 2 main categories:

- Satisfactory ≥ 75.0%)
- Unsatisfactory <75.0%)

Tool (III): A structured Interviewing questionnaire.

The researchers developed it for the women undergoing CS in simple Arabic language based on the related literature ***(Qiang et al., 2020).*** It was used for the women in both groups. It was composed of the following three parts:

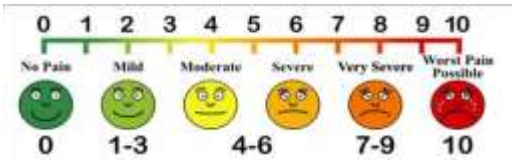
Part 1: Demographic Characteristics of studied women such as (age, education, occupation, residence, and telephone number**).**

Part 2: Assessment of women's knowledge to enhance recovery as healthy nutrition and exercise, precautions against discomforts during elimination, and post-discharge instructions regarding (care of CS wound, pain control measures, bowel habits, warning signs required to call the surgeon, activities/exercise, diet, prescribed medications).This part was used twice before and after intervention for both groups.

Knowledge scoring system: Each question received a score of (2) for accurate and complete answers, a score of (1) for correct but incomplete answers, and a score of (0) for incorrect answers. The sum of the scores for each section's items was used to determine the section's overall score. The sum of the scores from each section was added to determine the participant's overall knowledge score. It was calculated to find the mean and standard deviation. Total knowledge score was classified as Poor <60.0%, Average 60 % to 75%, and Good >75.0%.

Tool (IV): An observational checklist for the women undergoing CS: The researchers developed the checklist based on relevant literature **(*Abd El-Ati, et al., 2019)*** and used for women in both groups to record improvement indicators after CS such as pain intensity, first time of sitting in bed, first time of ambulation out of bed after surgery (hours), bowel mobility (hours), initiation of breast feeding (hours), initiation of emotional contact (hours), length of hospital (days) and period of suture removal (days). Also, complications after CS among women in each group was recorded after two to four hours, three days and after two weeks such as nausea, vomiting, retention of urine, wound bleeding, pulmonary complications, abdominal distension and constipation, breast engorgement and breast abscess.

Tool (V): Visual Analogue Scale (VAS): It was used for quantifying pain assessment. It consists of a 10-cm line that is either vertical or horizontal and has statements like "no pain" and "the worst pain possible" fastened at each end. The score of pain is the precise length in centimeters of the segment between zero and the checked point. No pain 0, Mild 1<4, Moderate 4<7 and Severe 7≤10. The researchers utilized a scale created by ***(Crichton, 2001)*** that was divided into three colors according on the intensity of the pain, with light pain being colored green, moderate pain being colored orange, and severe pain being colored red so that the pregnant ladies could understand it.



Crichton. (2001) Visual Analogue Scale (VAS) .J Clin Nurs, 10(5),706-6.

<u>Developed Supportive material</u> (educational booklet for nurses)

The researchers developed the supportive material based on the recent relevant literature to enhance maternity nurses' knowledge and practices regarding implementation of ERP protocol for cesarean delivery It include, an introduction, general and specific educational objectives and the scientific content. The program content included preoperative, intraoperative, and postoperative CS care. To make its contents easier to understand, it was written in straight forward language and featured a variety of informative images.

Figure 1: Components of ER Protocol for Cesarean Delivery

Reference: Lucas DN, & Gough KL., (2013); Enhanced recovery in obstetrics--a new frontier? *Int J Obstet Anesth.* 22(2): 92–5.

Procedures:

Administrative phase:

Before implementation of the study, an official permission was obtained from the Dean of the Faculty of Nursing directed to the Director of the pre-mentioned setting (Obstetrics department in Benha University Hospital,) after full explanation of the aim of the study.

A verbal consent from nurses and women to participate in the study was obtained after explanation of the research purposes.

Tools validity: The study tools were reviewed to ascertain their content validity by three experts from Obstetrics and Gynecological Medicine and Nursing who reviewed the tool for clarity, relevance and comprehensiveness, understanding and applicability; modifications were carried out according to the panel' judgments on clarity of sentences and the appropriateness of content.

Tools Reliability: Test-retest was used. The internal consistency of the tools was calculated using Cronbach's alpha coefficient test which revealed that the tools consisted of relatively homogenous items as showed by the moderate to high reliability of each tool at Cronbach's alpha 0.85 for tool (1), 0.77 for tool (2), 0.85 for tool (3).

Ethical Considerations:

The research proposal was approved from Ethical committee in the Faculty of Nursing at Benha University. There was no risk for nurses and women during application of the research. The study followed the common ethical principles in research. Oral informed consent was obtained from every participant before inclusion in the study. Confidentiality and anonymity, as the data were exclusively gathered for research purposes was assured. Participants have the right to refuse to participate or withdraw from the study without any rational any time.

A Pilot study: was carried out on 10% of the entire sample (5 nurses and 20 women undergoing CS) to ensure the clarity, feasibility, and applicability of the tool, as well as time for data collection. The pilot sample was included into the main study sample as there was no modification done in the tool.

Field of work: The study was carried out through 4 phases:

Interviewing phase

In the aforementioned settings, the researchers presented themselves to the medical and nursing staff members and discussed the objectives, design, and advantages of the study. Each maternity nurse was interviewed by the researchers, who also evaluated their level of ERP protocol knowledge and practices of women undergoing CS before its application. Questionnaire completed between 20-30 minutes. Data collected over a six-month period commencing in January 2021 and ending in June 2021 Three days/week, from 8 am to 2 pm, the researchers were available in the study settings.

Planning phase:

Based on pre-test results an educational material about ERP protocol prepared by the researchers and including the care phases presented for the maternity nurses. It included pre, intra, post-operative care and newborn care based on recent literature review ***(Mostafa, 2019).***

Implementation phase:

a. For maternity nurses

After collected demographic, professional and pretest data of nurses. The researchers provided two educational sessions (each session took 45- 60 minutes) about ERP protocol of CS for the maternity nurses with illustrated booklet. It included definition, importance, components, and nurses' role. Each session included (5-6) nurses as those responsible for providing care to the women undergoing CS. After ending the explanation of ERP protocol for all nurses, the researchers applied the ERP protocol on 20 women undergoing CS. These women considered the pilot study and included in the studied sample. After that, the maternity nurses applied all steps of ERP protocol for the study group of women in front of the researchers.

b. For CS women:

The researcher divided women randomly into two groups. Study group who received ERP protocol and control group who received routine hospital care of CS (pre-and post- operative) according to hospital policy. Randomization was done through computerized generated tables then closed envelopes containing the number of women had been assigned into two groups either control or study groups.

- **For Control group:**

The researchers started with the control group. Purpose and nature of the study were explained to each woman individually. The researchers began filling out the interview questionnaire sheet to evaluate the " socio- demographic characteristics, as well as their knowledge regarding CS care and instruction about home care. It took from 15 to 20 minutes. After receiving routine hospital care the researchers observed women in control group for improvement indicators and complications during hospital stay. Then after discharge the follow up done by telephone at third day and after two weeks.

Women in control group were received routine hospital care according to hospital policy as preoperative night fasting (12am) from food and drink, mechanical bowel preparation such as enema and laxative, medication, routine use of tubes as urinary catheter, no early oral feeding until presence of bowel motility. For post-operative pain control, Ketolac (50mg, 4×1) and non-steroid anti- inflammatory medicine was administered IV. Women were encouraged for early breastfeeding and ambulation after delivery if they were not hypotensive and uterine bleeding was under control.

- **For study group Preoperative ERP**

Before surgery women in the study group were provided information about the ERP protocol and what to expect during the hospital stay, and at day of Surgery: Preoperative:

The study group received acetaminophen 1 gram orally two hours prior to surgery, thrombo- prophylaxis in women with a high risk of deep vein thrombosis (DVT), and a warming blanket 30 minutes prior to surgery or even wrapped the patient in a blanket to keep her warm if an active warming blanket is not present, while the control group did not receive pain prophylaxis or warming. The women should avoid makeup, remove all jewelry, do not use nail polish on fingernails. The nurse asked the women to change the clothes into a hospital gown.

Intra operative ERP:

Woman was given warm intravenous fluids prescribed by physician to maintain as normal a body temperature as possible. The nurse administered various medicines prescribed by the medical team. These medicines assist in prevention of nausea and vomiting. Localized anesthetic, either an epidural or a spinal was given. Following anesthesia, the vagina is cleaned with iodine, and a urinary catheter was placed in an entirely sterile environment using an antiseptic, typically an alcohol solution containing chlorhexidine, to clean the skin. Before cesarean delivery, vaginal cleaning may lower the incidence of endometritis and postpartum fever. After delivery of the fetus and the placenta assess Apgar score, delay cord clamp for at least one minute, maintain newborn body temperature (36.5℃ – 37.5℃) after birth. In the operating room skin-to-skin contact should be encouraged as soon as possible after birth. Take immediate care of the newborn. After the newborn is delivered Ecbolic is routinely given to reduce the risk of PPH. The woman and newborn were sent to the recovery room after the delivery and remained there till the night.

Post-operative care

The nurse role included observation for the first 6–8 hours is important. Frequent checkup of pulse, BP, uterine contractility, lochia, and catheter. Women should maintain comfort and warm. Fluid-Sodium chloride (0.9%) or Ringer's lactate drip is continued until at least 2–2.5 liters of the solution are infused. Remove catheter as soon as the woman regains the ability to move. Long-acting pain medications were prescribed by physicians such as acetaminophen1 gm orally or IV every 8 hours, and ibuprofen to keep the pain under control. Pain score was assessed by a visual analogue scale. Gradual oral nutrition 2 hours by liquid. The nurse should have applied methods (non-medication) to prevent post CS nausea and vomiting. Immediately following the restoration of motor function, mobilization and ambulation should return soon. Mobilization schedules start from dangling feet on the edge of the bed and sitting in the chair within the first 8 h postoperatively, followed by walking at least 1–2 times within 24 h postoperatively, followed by walking 3–4 times daily on the subsequent postoperative day. Antibiotics are given after 12 hours from leaving the hospital or according to the discharge protocol.

Discharge

The mothers in ERP group were discharged from the hospital within 24 hours postoperatively in uncomplicated cases and when the mother's ability to eat a diet without feeling nauseous or vomiting. Getting out of bed and walking without help. The nurse instructed the mother about scheduled medications after discharge for up to a total of 7 days. Beside that nonpharmacological methods of pain relieve should be applied. Encourage them about activities, should be out of bed for a total of 8 hours during the day. Give instruction about eating and drinking as drink lots of water and consume solid meals. Milk, fruit, vegetables, and calories are the best choices for supporting breastfeeding and preventing constipation (fruits, vegetables), gum chewing for 30 minutes three times a day if does not eat or drink regularly.

Instructions about home care:

Wound care: instruct the mother about importance of wash hands before and after touching wound or dressing. Showering is preferable to bathing. Do not rub soap, shower gels, or talc directly into the healing wound. Keep the wound dry. Wear loose-fitting underwear to prevent rubbing the wound. Bowel habits: Instruct the mother to drink 8-10 glasses of water daily, exercise and stool softeners may be used.

The women were instructed about warning signs required to call the surgeon as feeling feverish or have a high temperature, stop passing gas for more than 12 hours, significant diarrhea &worsening nausea or vomiting. The women were instructed about post-partum exercises over six weeks as walking, pelvic floor exercise and avoid lifting heavy anything for 2-3 weeks after surgery. No special diet is necessary unless ordered by the healthcare team. Resume a healthy, balanced diet.

Evaluation phase:

1. **For nurses**: After ERP protocol application, the researchers evaluated the knowledge of maternity nurses for CS using previous mentioned tools of data collection.
2. **For post cesarean section women:** A comparison was done between study group who received ERP protocol and control group who received routine hospital care regarding post operative knowledge concerning proper nutrition and exercise, actions to prevent elimination discomforts, besides the post discharge instructions regarding (care of CS wound, pain control measures, bowel habits, warning signs required to call the surgeon, activities/exercise, diet, prescribed medications).

Statistical design:

The Statistical Package for Social Sciences (SPSS) version 25 was used to examine the data before further exploration. To test the research hypothesis, descriptive

statistics were used. The characteristics of the subjects under study were described using descriptive statistics, including frequency, percentage, arithmetic mean, and standard deviation. A Fisher's Exact test (FET) was used to compare qualitative variables in order to determine their significance. To examine mean differences before and after the intervention, a paired T test was performed. Significance is measured by the p-value. At a P-value of 0.05, a difference was deemed statistically significant.

Results:

Table (1): shows that the demographic characteristics of studied nurses. Less than one third 60% of the nurses were aged from 20-<30 years with mean age 30.91± 6.54 years. Regarding academic qualification, more than one half of them had diploma in nursing. In addition, less than half of the studied nurses have 5-<10 years of experience with mean years of experience 9.72 ±3.81 years. Also, the minority of them attended training courses related CS care, with about three quarters of them attended these courses since 1-<5 years.

Table 2: illustrate the knowledge of studied nurses regarding the ERP Protocol before and after its application. It shows a significant improvement in the nurses' knowledge of all items of ERP Protocol such as definition, importance, components, and nursing role after the application compared to before the application; it was highly statistically significant differences (P<0.001**). As can be seen from the table, a high percentage of nurses answered all items regarding ERP correctly after the application (90%, 92 %, 98%, & 96 % accordingly).

Figure 1: clarify that an increase in the total nurses' knowledge after application of ERP Protocol than before as 97% of nurses were having good knowledge after the ERP Protocol application compared to 7% before the application.

Table 3: illustrate that the studied nurses' practice regarding care of cesarean section before and after application of ERP Protocol. There was a highly statistical significant difference in the nurses' practices related to pre, intra and post care of CS before and after the application of ERP Protocol (P<0.001**).

Table 4: Demonstrate the comparison maternity nurses' practice before and after application of enhanced recovery after surgery pathway regarding care of newborn. It showed a highly statistically significant difference in the studied nurses' practice toward the newborn care before and after application of ERAS pathway (P<0.001**).

Figure 2: illustrate the total practice's score of studied nursing toward care of CS and newborn before and after application of ERP Protocol. It showed that the majority (88%) of nurses had satisfactory practices after application of ERP protocol compared to 12% with highly statistically significant differences (P<0.001**).

Table (5) shows that the demographic characteristics of studied women. More than half (57.0% & 55.0%) of study and control group in age group from (25-<30years) with a mean age of 27.38 ± 3.34 & 27.32± 3.48 years respectively. Concerning educational level, more than one third (31.0% &32.0%) of both study and control group had a secondary education respectively. Besides, more than one half (54.0% &51.0%) of both study and control group respectively were lived in rural area. As regards occupation, nearly three quarter (75.0% &73.0%) of both study and control groups respectively were housewife. Regarding demographic characteristics, there was no statistically significant difference between the study and control groups. That is the two groups under study homogenous.

Table 6: clarify the knowledge of women in study and control group about home care post-cesarean delivery. It showed that highly statistically significant difference (P<0.001**) between both groups as women in the study group were having good knowledge regarding wound care, measures of pain control, measures to prevent elimination discomforts, activities/exercise, nutrition, and medications as prescribed (81.0%, 87.0%, 85.0%, 86.0%, 89.0%, & 44.0%, respectively) compared to (21.0 %, 53.0%, 31.0%, 25.0%, 24.0% & 11.0% respectively) in the control group.

Table (7) Demonstrate the mean vital signs in studied women in both study and control groups in first day after cesarean section. It showed that there was no statistically significant difference between both study and control groups regarding body temperature values, respiratory rate, and heart rate whereas P value > 0.05. Although there was a highly statistically significant difference in blood pressure between the two groups. It was noted that women in the control group experienced hypotension of the systolic and diastolic pressure more frequently than those in the study group. (P <0.001**)

Figure (3): illustrate the distribution of studied women's (study & control groups) level of pain on the first, third day, and two weeks postoperative. It revealed that (6.0, 78.0, and 98.0% respectively) of the women in the study group experienced mild pain compared to (4.0, 14.0, and 89.0) respectively in the control group. The difference was statistically significant at (P <0.001**)

Table (8) shows the comparison of the studied women's (study and control groups) post-cesarean improvement indicators. It illustrated that women in study group were significantly more able than those in the control group to start oral fluid within the first five hours after surgery (85.0% vs. 8.0%, respectively) with mean of (4.35±1.97 vs.7.94±3.70 hours respectively) P<0.001*. Meanwhile, (74.0%). within the first 12 hours following surgery women in the study group begin a regular diet, as compared to (20.0%) in the

control group with a highly significant difference (P<0.001*) In addition, (76.0%) of study group were less likely suffer from vomiting compared to (55.0%) of control group. Moreover almost (95.0%) of women in study group not required to antiemetic compared to more than three quarters of control group a with a highly significant difference between the two groups (P<0.001**)

By contrast, just 13.0% of the control group had sat down for the first time in less than two hours compared to 50.0% of the study group, with a highly statistically significant difference (P <0.001**). Almost (95.0%) of study group started ambulation out of bed in less 5 hours of the operation compared to (73.0%) of the control group with a highly statistically significant difference (P<0.001**). As regards postoperative exercises, it reveals that (88.0%) in the study groups practiced the required exercises compared to only (18.0%) in the control group with highly statistically significant (P<0.001**).

The study group's participants also had shorter average periods for their first bowel sound, first flatus, and first passage of a stool after cesarean section (3.9± 5.0, 5.6±1.4), (6.5±1.4, 11.7±1.8), and (12.4±1.6, 21.83. 1hours respectively). Differences observed were statistically significant (P<0.05).

Figure (4) clarify the distribution of studied women in both study and control groups regarding initiation of breast feeding and initiation of emotional contact. It showed that (77.0%) of the study group had early initiated breast feeding (<2hours from C/S) compared to those in the control group (8.0%). Also (58.0%) of study group had initiation of the emotional contact with their newborn babies (<2 hours from C/S) while (75.0%) of control group had initiation the emotional contact (>2 hours from C/S). Differences observed were statistically significant (p<0.001).

Table (9) reveals the distribution of studied women in both study and control groups regarding post- cesarean complications. It demonstrated that nausea and vomiting more common in the control group (83.0 % and 34.0 %, respectively) than in the study group (15.0 % and 34.0 %, respectively). In the control group, DVT (3.0 % vs. 0.0 %) in the study group and urine retention (2.0 % vs. 0.0 %) in both groups respectively with a statistically significant difference. Engorgement of the breasts in both study & control groups were seen (5 % vs. 13 % respectively). When compared to abdominal distension and constipation (60.0 % vs. 34.0 %), in the first day and (40.0 % vs. 23.0 %), hemorrhoid (5.0 % vs. 2.0 %) on the third day. It indicates that there were statistically significant differences (P<0.010)*) between the two groups in terms of wound infection and puerperal sepsis (2.0 % vs 0.0 % respectively), constipation (22.0 percent vs 8.0 percent)

Table (1): Distribution of the studied nurses according to their demographic characteristics (n=50).

Variable	No.	%
Age		
20-<30 years	30	60.0
30-<40 years	14	28.0
≥ 40 years	6	12.0
Mean ± SD	30.91 ± 6.54	
Academic qualification		
Diploma in Nursing	26	52.0
Technical Nursing Institute	20	40.0
Bachelor of Nursing	4	8.0
Years of experience		
<5 years	14	28.0
5-<10 years	21	42.0
10-<15 years	10	20.0
≥ 15 years	5	10.0
Mean ± SD	9.72 ± 3.81	
Attendance of training courses related CS care		
Yes	4	8.0
No	46	92.0
Duration since attendance of training courses (n=4)		
1-<5 years	3	75.0
5-<10 years	1	25.0
≥ 10 years	0	0.0

Table (2): Distribution of studied nurses regarding their knowledge about enhanced recovery pathway after surgery protocol items pre and post application (N= 50)

Variables	Pre		Post		X^2 / FE_P	P value
	No	%	No	%		
Definition of enhanced recovery pathway of cesarean section: -						
- Correct & complete	4	8.0	45	90.0	87.77	.000**
- Correct & incomplete	5	10.0	3	6.0		
- Incorrect	41	82.0	2	4.0		
Importance of enhanced recovery pathway of cesarean section for mothers and newborn care: -						
- Correct & complete	2	4.0	46	92.0	95.06	.000**
- Correct & incomplete	4	8.0	2	4.0		
- Incorrect	44	88.0	2	4.0		
Components of enhanced recovery pathway of cesarean section: -						
- Correct & complete	2	4.0	49	98.0	123. 20	.000**
- Correct & incomplete	5	10.0	1	2.0		
- Incorrect	42	84.0	0	0.0		
Nurses' role in enhanced recovery pathway application: -						
- Correct & complete	3	6.0	48	96.0	99.07	.000**
- Correct & incomplete	2	4.0	1	2.0		
- Incorrect	45	90.0	1	2.0		

X^2: Chi-Square test FE_P: Fisher's Exact test **highly statistically Significant at: P ≤0.001

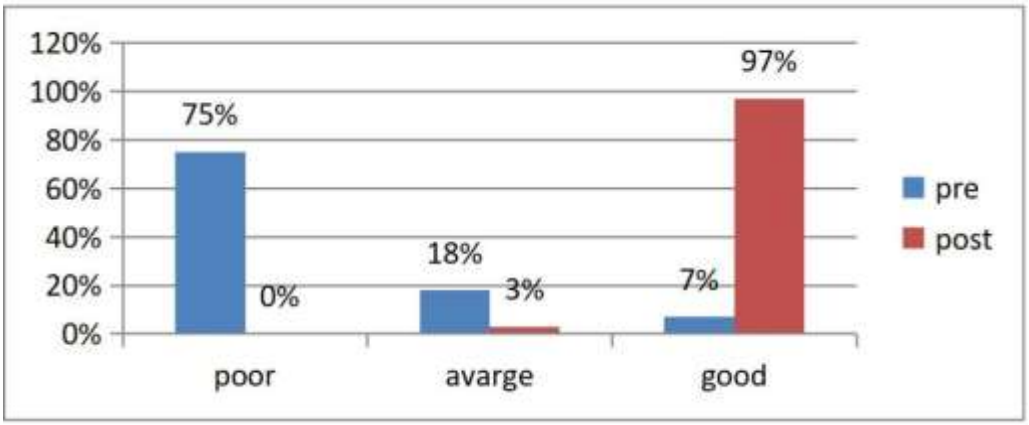


Figure (1): Total knowledge scores of studied nurses regarding enhanced recovery pathway after surgery protocol items before and after its application (Pretest and Posttest) (N=50)

Table (3): Disruptions of studied nurse's practice regarding care of cesarean delivery before and after application of enhanced recovery pathway after surgery protocol (N= 50)

Variable	Pre				Post				χ^2 / FE_P	P value
	Done Correctly		Done Incorrectly		Done Correctly		Done Incorrectly			
	No	%	No	%	No	%	No	%		
Pre-operative care Provide complete information about the protocol and take an oral formed Consent	15	30.0	35	70.0	50	100.0	0	0.0	98.23	0.001**
Educational materials in print provided to women	8	16.0	42	84.0	49	98.0	1	2.0		
Assessment for diet, fluid, caloric intake, and fasting time	12	24.0	38	76.0	50	100.0	0	0.0		
Review the women record for pre-operativemedications and Investigations	19	38.0	31	62.0	50	100.0	0	0.0		
Preparation of bowel	18	36.0	32	64.0	50	100.0	0	0.0		
Cleaning and bathing	14	28.0	36	72.0	50	100.0	0	0.0		
Contact with the patient the day before the delivery to review ERAS goal	11	22.0	39	78.0	49	98.0	1	2.0		
Intraoperative pathway									25.64	0.001**
Antibiotics as prophylactic	19	38.0	31	62.0	50	100.0	0	0.0		
- Thrombo- prophylaxis	8	16.0	42	84.0	48	96.0	2	4.0		
Asses I.V line and blood pressure management	7	14.0	43	86.0	48	96.0	2	4.0		
- Preparation of the skin	9	18.0	41	82.0	50	100.0	0	0.0		
- Active warming to prevent hypothermia	11	22.0	39	78.0	50	100.0	0	0.0		
- Oxytocin management	50	100.0	0	0.0	50	100.0	0	0.0		
post-operative pathway									45.75	0.001**
- Control of pain	50	100.0	0	0.0	50	100.0	0	0.0		
Early gradual oral nutrition starts 2 hours by liquid such as warm fluid	50	100.0	0	0.0	50	100.0	0	0.0		
- Preventive measures for potential complications	50	100.0	0	0.0	50	100.0	0	0.0		
Prophylaxis of postoperative nausea and vomiting	12	24.0	38	76.0	50	100.0	0	0.0		
Early progressive ambulation starts two hours after surgery	11	22.0	39	78.0	50	100.0	0	0.0		
Early removal of all tubes, drains and catheter	2	4.0	48	96.0	50	100.0	0	0.0		
- Breast feeding education	14	28.0	36	72.0	50	100.0	0	0.0		
- Record outcomes or complications if present	7	14.0	43	86.0	50	100.0	0	0.0		

X^2: Chi-Square test FE_P: Fisher's Exact test **highly statistically significant at: P ≤0.001

Table (4): Maternity nurses' practices regarding care of newborn before and after application of enhanced recovery pathway after surgery protocol (N= 50)

Variable	Pre				Post				χ^2	P value
	Done Correctly		Done Incorrectly		Done Correctly		Done Incorrectly			
	No	%	No	%	No	%	No	%		
Assess the Apgar score at 1st and 5th minute	4	8.0	46	92.0	49	98.0	1	2.0	56.37	0.001**
Delay umbilical cord clamp for at least one minute	9	18.0	41	82.0	48	96.0	2	4.0	87.52	0.001**
Maintain body temperature of newborn after birth between (36.5°C – 37.5°C)	5	10.0	45	90.0	40	80.0	10	20.0	69.89	0.001**
Suctioning the airway if obstruction present	10	20.0	40	80.0	46	92.0	4	8.0	59.64	0.001**
Initiate skin to skin contact	6	12.0	44	88.0	48	96.0	2	4.0	47.34	0.001**
Assess the weight and all measurements of newborn	13	26.0	37	74.0	50	100.0	0	0.0	54.59	0.001**

X^2: Chi-Square test. **Highly statistically significant at: P ≤0.001

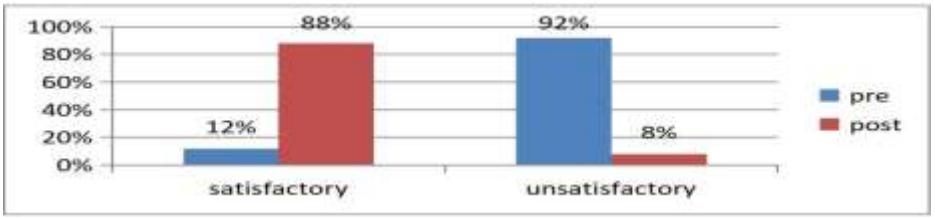


Figure (2): Total practice's scores of studied nurses regarding care of CS and newborn before and after application of enhanced recovery pathway after surgery protocol (Pretest and Posttest) (N=50)

Table (5): Distribution of the studied women in study and control group according to their Socio- demographic characteristics (n=200).

Variables	Study Group (n=100)		Control Group (n=100)			
	No.	%	No.	%	X2 & T test	P value
Age (years)						
20- < 25	25	25.0	29	29.0		
25-< 30	57	57.0	55	55.0	0.450	0.79
≥30- 35	18	18.0	16	16.0		
Mean ±SD	27.38 ± 3.34		27.32 ± 3.48		0.124	0.901
Educational Level						
Illiterate	11	11.0	10	10.0		
Read/write	5	5.0	4	4.0		0.343
Basic education	23	23.0	24	24.0	5.760	
Secondary education	31	31.0	32	32.0		
University education	30	30.0	30	30.0		
Residence						
Urban	46	46.0	49	49.0		
Rural	54	54.0	51	51.0	4.304	0.162
Occupation						
Working	25	25.0	27	27.0		
Housewife	75	75.0	73	73.0	1.237	0.264

T value, independent sample t test χ 2: Chi-Square test. No statistical significant at: P ≥0.05

Table (6) Distribution of studied women in study and control group regarding their knowledge about home care post-cesarean delivery before intervention (N=200)

Variables	Study group (N=100)		Control group (N=100)		χ 2	P value
	No	%	No	%		
Care of CS wound:						
- Good	81	81.0	21	21.0		
- Average	13	13.0	38	38.0	78.63	0.001**
- Poor	6	6.0	41	41.0		
Measures of pain control:						
- Good	87	87.0	53	53.0		
- Average	10	10.0	27	27.0	39.13	0.001**
- Poor	3	3.0	20	20.0		
Prevent elimination discomforts:						
- Good	85	85.0	31	31.0		
- Average	12	12	58	58.0	89.03	0.001**
- Poor	3	3.0	11	11.0		
Activities/exercise:						
- Good	86	86.0	25	25.0		
- Average	9	9.0	30	30.0	92.18	0.001**
- Poor	5	5.0	45	45.0		
Nutrition:						
- Good	89	89.0	24	24		
- Average	7	7.0	29	27.0	86.21	0.001**
- Poor	4	4.0	47	49.0		
Medications as prescribed:						
- Good	44	44.0	11	11.0		
- Average	51	51.0	15	15.0	75.76	0.001**
- Poor	5	5.0	74	74.0		

X^2: Chi-Square test. **Highly statistically significant at: P ≤0.001

Table (7) Mean vital signs of the studied women in both study and control groups in first day after cesarean section (n=200).

Vital signs	Study Group (n=100)	Control Group (n=100)	Test of sig	P
Temperature Mean ± SD.	36.90 ± 0.242	36.97 ± 0.428	t=-1.423	0.175
Respiratory rate Mean ± SD.	25.06 ± 0.8	24.43± 0.99	t=0.266	0.681
Heart rate Mean ± SD.	76.82 ± 4.22	78.04 ± 4.35	t=0.843	0.065
Hypotension of Systolic Mean ± SD	97.57 ± 3.66	85.14 ± 3.88	t=13.754	0.001**
Hypotension of Diastolic Mean ± SD	67.0 ± 0.0	53.25 ± 3.21	t=27.312	0.001**

Independent T test No statistical significant at: P ≥0.05 **highly statistical significant at: P ≤0.001**

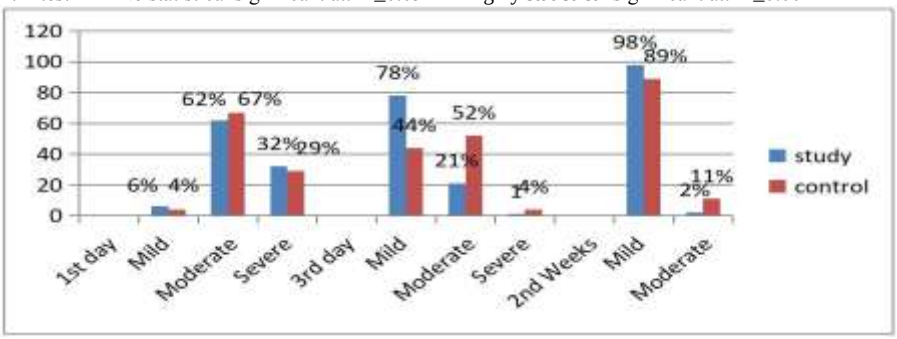


Figure (3): Distribution of studied women in study and control groups according to level of pain on the first, third day, and two weeks postoperative (n=200)

Table (8): Distribution of the studied women in study and control groups according to post-cesarean improvement indicators (n=200)

Variables	Study Group (n=100)		Control Group (n=100)		Test& P value	
	No.	%	No.	%	X^2	P
Initiation of oral fluids (hours)						
<5	85	85.0	8	8.0		
5 – 10	11	11.0	70	70.0	119.19	0.001**
>10	4	4.0	22	22.0		
Mean ±SD	4.35 ±1.97		7.94 ± 3.70		8.552	0.001**
Initiation of regular diet (hours)						
<12	74	74.0	20	20.0	5.281	0.001**
12 – 24	20	20.0	61	61.0		
>24	6	6.0	19	19.0		
Mean ±SD	11.61± 3.22		14.91± 5.35		16.26	0.001**
Vomiting in first day						
None	76	76.0	55	55.0	19.53	.001**
1-2	21	21.0	30	30.0		
3 or more	3	3.0	15	15.0		
Need for antiemetic						
Yes	5	5.0	22	22.0		
No	95	95.0	78	78.0	12.37	0.001**
First time of sitting "hours"						
<2	50	50.0	13	13.0		
2– 4	49	49.0	80	80.0	48.70	0.001**
>4	1	1.0	7	7.0		
Mean ±SD	2.11 ± 0.88		3.06 ± 0.70			
First time of ambulation out of bed "hours						
<5	95	95.0	73	73.0	18.050	0.001**
5 – 10	3	3.0	18	18.0		
>10	2	2.0	9	9.0		
Mean ±SD	4.20 ±1.034		5.12 ±2.13		T=3.873	0.001**
Bowel mobility (hours)					T	
First bowel sound	3.9± 5.0		5.6±1.4			
First passage of flatus	6.5±1.4		11.7±1.8		89.152	0.001**
First passage of stool	12.4±1.6		21.8 ± 3.1			
Practice exercise after cesarean section						
Yes	88	88.0	18	18.0	98.35	0.001**
No	12	12.0	82	82.0		
Length of hospital stay (days)						
Mean ± SD	1.3±0.6		1.8±0.5		T= 5.921	0.001**
The period of suture removal (days)					T= 0.34	1.000
Mean ± SD	7.02 ±0. 28		7.02± 0.34			

Independent T test **Highly statistical significant at: P ≤0.001

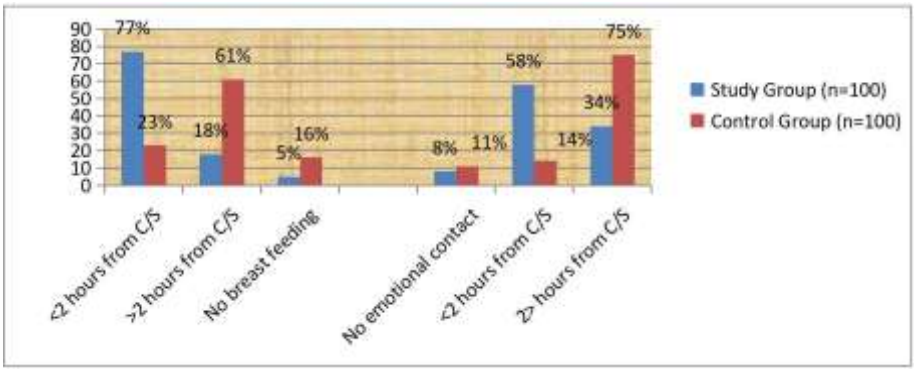


Figure (4) Distribution of studied women in both study and control groups regarding initiation of breast feeding and emotional contact (n= 200)

Table (9): Distribution of studied women in both study and control groups regarding post-cesarean complications (n=200)

Complications	Group				Test & Significance
	Study (n= 100)		Control (n=100)		
	No	%	No	%	
At 1st day					
Nausea	33	33.0	83	83.0	X^2=5.181 (0.001**)
Vomiting	15	15	34	34.0	183.13 (0.001**)
Retention of urine	0	0.0	2	2.0	FEP=1.33 (0.001**)
Wound bleeding	0	0.0	2	2.0	FEP=0.498 (0.010*)
D.V.T	0	0.0	4	4.0	FEP=0.476 (0.043*)
Pulmonary complications	0	0.0	4	4.0	FEP=0.476 (0.043*)
Abdominal distension and Constipation	34	34.0	60	60.0	X^2=13.56 (0.001**)
At 3rd day					
UTI	0	0.0	1	1.0	FEP=1.1
Breast engorgement	5	5.0	13	13.0	X^2=3.907 (0. 048*)
Breast abscess	0	0.0	2	2.0	FEP=1.0
D.V.T	0	0.0	3	3.0	FEP= 0.451(0.029*)
Constipation	23	23.0	40	40.0	X^2=6.697 (0.010) *
Hemorrhoids	2	2.0	5	5.0	X^2=8.00(0.005)*
At 2weeks					
Breast Abscess	0	0.0	1	1.0	FEP=1.1
Wound infection	0.	0.0	2	2.0	FEP=0.498(0.010)*
Puerperal sepsis	0	0.0	5	5.0	FEP=1.1
Constipation	8	8.0	22	22.0	X^2=.0907 (0.034)*
Hemorrhoids	4	3.0	15	15	X^2=5.180(0.023)*

X^2: Chi-Square test ^{FE}P: Fisher's Exact test No statistical significant at:P ≥0.05 * statistically significant **highly statistical significant

Discussion:

The caesarean section (CS) is one of the most popular surgical procedures. The caesarean rate has dramatically increased on a global scale, which currently exceeds 30%. The number of cesarean births has significantly increased reaching 31.7% in 2019, (31.8%) in 2020 ***(Hamilton et al., 2020).*** The integration of advances into standard clinical practice is a significant challenge in the healthcare industry. Furthermore, the Enhanced Recovery Passway protocol (ERP) applies a variety of strategies, measures, and methodologies to patients who are about to have surgery with the goal of enhancing recovery, lowering stress, reducing complications, and reducing mortality ***(Rocha et al.2014)***.

The current study aimed to investigate the effect of (ERP) protocol on postoperative outcomes for women undergoing cesarean delivery. A quasi-experimental design was used, the study was conducted at Obstetrics and Gynecology department of Benha University Hospital and included 200 women undergoing elective-CS divided into two equal groups study group received ERP protocol and control group received routine hospital care.

On assessing maternity nurses' knowledge about ERP Protocol, The current study showed a highly statistically significant improvement in the nurses' knowledge of all ERP Protocol items

(definition, importance, components, and nursing function) after the application compared to before the application. as a high percentage of nurses answered all items regarding ERP correctly after the application, also there was an increase in total knowledge scores after application of ERAS pathway this improvement highlighted the positive effect of implementing such new evidence protocol on maternity nurses, they always need to engage in new era in the field of practice to improve their profession.

Examining maternity nurses' practices related to CS care pre, intra and postoperatively, the current study assured that implementing ERP protocol has positive impact on improving maternity nurses' practice as regard to CS care at this study finding that illustrated that there was a highly statistical differences in the nurses' practices related care of CS at pre, intra and postoperative care as well as caring of newborn before and after the application of ERP protocol (P<0.001).

As regards demographic characteristics of studied CS women, analysis of our findings revealed that more than half of study and control groups their age group from (25-<30years)with mean age (27.38±3.34, 27.32±3.48 years) respectively. Approximately one third of sample in both groups had secondary education. Slightly more than half in both groups live in rural areas. Three quarter of sample in study and control group is housewife. These results were incongruent with study by ***Khalil & Shahin (2020).***They was examining how the nursing clinical pathway affected high-risk pregnant women's self-assessments of fetal well-being. They discovered that the study participants' ages ranged from 20 to 40 years, with 66.6% being younger than 30 years old, more than two thirds having completed secondary school, and more than half being employed women. This finding was agreed with ***Abd El-Razek (2018)*** who was researching the impact of instituting a clinical pathway to improve delivery and newborn outcomes and found a mean age of women in the study and control groups were, respectively, 20.40± 3.37 and 26.32 ±4.29 years.

On investigating women's vital signs at first day after the operation for both groups, the current study revealed that most of the women's vital signs were within the normal limits. It was noted that a higher number of women in the control group compared to those in the study group had hypotension of the systolic and diastolic pressure. Since cases with pregnancy disorders were excluded according to the exclusion criteria, this was expected. In contrast to the control group, less women in the study group were exposed to higher temperatures "during the first day after the surgery." This may be related to nursing interventions for treating fever, such as applying cool compresses or giving oral fluids. Certainly, the most common methods of anesthesia for cesarean sections is spinal anesthesia. However, a significant rate of maternal hypotension is linked to spinal anesthesia ***(Betrán et al., 2016).***

Concerning post-cesarean improvement indicators among both study and control group after intervention, our findings indicates that women in the study group were significantly more able than those in the control group to start oral fluid intake within the first five hours after surgery with mean of (4.35±1.97 vs. 7.94±3.70 hours respectively). In contrast, just one fifth of the women in the control group begin a regular diet within the first 12 hours after surgery, compared to nearly three quarters of the study group's participants. In addition, more than three quarters of study group were less likely suffers from vomiting compared to more than half of control group. Moreover, almost of women in study group not required to antiemetic compared to more than three quarters of control group with a highly significant difference between the two groups.

Similar findings were revealed by ***Gong, et al., (2015)*** who noticed that the entire study group who started early feeding had an early return of bowel. According to the results of the current study, women in the study group were significantly (P<0.001**) more likely than those in the control group to begin oral fluids within the first two hours following the surgery. Less vomiting as well as easily elimination than the control group (P<0.001**). This is quite plausible as the trouble. According to various studies, early hydration following uncomplicated CS is a safety measure that doesn't raise the risk of gastrointestinal problems.

On accordance and concerning to ***(Kalogera et al., (2013) ;Wijk et al.,(2014)***. The frequency of ileus symptoms, the average time between bowel movements, and the length of IV administration were decreased. Additionally, it results in successful breastfeeding, less side effects, faster postoperative wound healing, a shorter hospital

stay, and cost savings. The mean time between the first bowel sounds, the first passage of flatus, and the first feces following surgery was shorter in the study group's patients.

According to ***Al-Ghareeb et al (2013)*** study in the Kingdom of Saudi Arabia about the impact of early oral hydration on post-cesarean outcomes, the median time for the experimental group to start having bowel sounds was 3 hours, compared to 6.5 hours for the control group. As a result, the bowel movement returned substantially earlier for the study group, with a median duration of 29 hours as compared to 54 hours for the control group.

Regarding mobilization of women during post- operative period our findings revealed that with a highly statistically significant difference (P<0.001*), more than one tenth of the control group had not sat for the first two hours whereas almost half of the study group had just started their first time setting. In contrast to three quarter of the control group, almost all members of the study group began getting out of bed in less than 5 hours after the surgery with a highly statistically significant difference (P<0.001**). As regards postoperative exercises, it reveals that the majority in the study groups practiced the required exercises compared to only less than one quarter in the control group with highly statistically significant (P<0.001**). Respiratory, walking exercise, leg exercises and pelvic floor were the most common exercises, with highest percentage in the study group than the control group.

These results were agreement with study findings for ***Abd Elati & Mostafa, (2019)*** where with a statistically significant difference (P<0.001), just one-fourth of the control group had started their first time of sitting for less than two hours as compared to approximately two-thirds of the women in the study group. Also, in line with the study by ***Vlug et al., (2012),*** who demonstrated that a failure to mobilize is a frequent cause of ERP violation and is linked to a longer hospital stay. Conversely, ***Kim, et al.,(2013)*** reported that early ambulation was not associated with length of hospital stay (LOS).

Implementing the ERP protocol regarding CS had a good impact on the degree of pain, which was a significant finding in the current study. According to the current study, compared to less than half of the control group, more than three quarter of the study group experienced minor pain on the third postoperative day. Meanwhile, almost all study group women had mild pain level in 2nd week compared to the majority of control group. Evidence has shown that inadequate postoperative pain management causes patients to experience negative physiological and psychological effects, increases morbidity, mortality, and the need for re-admission for pain management, lengthens hospital stays, and delays patients' return to normal activities, all of which increase costs **.** Our findings were in agreement with ***Modesitt et al., (2016).*** They discovered that the control group's median pain scores were 3.7, while it was 5 for ERP protocol patients, (P<0.001).

Concerning length of hospital stay among women in the study and control groups, the current study illustrated that of most of study group length of stay (LOS) was 1-2 day on the other hand two thirds of control group LOS was 1-2 day and five percent only of study group (LOS) extends to 3 days and more. These results in the same line with study finding ***Abd Elati & Mostafa, (2019),***who reported that the study group's average hospital stay was significantly shorter than that of the control group. This implies that the program was effective in improving women condition and led to early hospital discharge. Meanwhile, ***Abd El-hamid (2007)***, ***Kalogera et al.,(2013) & Modesitt et al., (2016) and, Eva et al., (2016)*** reported that fifth of women had the period of hospital stay extended to four days and more.

Breastfeeding should be started as soon as possible after CS, preferably within the first hour, as sucking causes the release of hormones that aid in the production of milk. Additionally, it causes the uterus to contract after childbirth, lowering the risk of postpartum hemorrhage ***(Mohan, 2018)***. According the current study findings, more than three quarters of the study group had early began breastfeeding (<2 hours from C/S), compared to fewer than one tenth of those in the control group, Also, more than half of study group had initiation of the emotional contact with their newborn babies (<2 hours from C/S) with highly statistically significant (P<0.001). These results supported the positive effect of implementing ERP protocol on educating mothers about such important and neglected issues related to breast feeding practices after CS.

Similarity, a study done by ***Mohammed. & Shehata, (2021)*** to investigate Effectiveness of a Breast Problems Instructional Module for Post-Cesarean Mothers. According to the current study, the majority of the sample analyzed initiated breastfeeding after the first two hours post-cesarean, more than half breastfed their infants for ten minutes, and the frequency of breastfeeding was one hour. Late shifting from recovery, pain, and discomfort following a cesarean section were the most common causes of delayed breastfeeding after cesarean delivery. This backed up the findings that it's harder to start and maintain early breastfeeding after a cesarean birth than it is after a vaginal birth.

Regarding post – cesarean complications among women in the study and control groups, the present study indicated that women in the study group were less likely to experience postoperative complications compared to the control group, this finding was agreed with ***Dehcheshmeh, (2011) & Modesitt et al. (2016)*** who noticed that complications rates reduced among the study group in comparison with those in the control group. Such finding is matching with the present result where compared to women in the control group, women in the study group were less likely to experience problems such abdominal distension and constipation. However, in contrary ***Wijk et al., (2014)*** they found no significant variations in the rates of problems between the two groups.

In summary, the ERP protocol can hasten postoperative recovery, encourage a better recovery, and is safe and successful in the perioperative care of cesarean section deliveries, decrease postoperative complications, and shorten the length of hospital stay. From the researchers' perspective. The ERP protocol now promotes the use of minimally invasive surgery in various sectors, and since cesarean sections are developing and becoming a common surgery, we eagerly await more literature that details the use of ERAS in the field of obstetrics. An ERAS team is necessary to ensure that each step is taken in clinical practice, to provide precise and tailored patient treatment, to increase patient compliance, and to support patient recovery, as well as improving nurses' practice regarding important issues in perioperative care of CS women. These findings from this research supported the research hypotheses and achieved the aim of the study.

Conclusion

According to the study findings, it could be concluded that the implementation of the ERP protocol had positive effect on total nurses' knowledge and practices scores after its application than before. Also, there was a higher statistically significant increase in total knowledge scores of the women undergoing cesarean section who received the ERP protocol than those who received the routine hospital care only regarding home care of post-cesarean delivery. The current study also demonstrated that the use of the ERP protocol after CS had a statistically significant positive impact on postoperative outcomes and a decline in the frequency of problems in the immediate postoperative period. In addition, there was highly statistically significant decrease in the women's postoperative pain scores than those who received the routine hospital care only. Therefore, all study hypotheses are supported throughout these study findings.

Recommendations:

Based on the result of the present study, the following recommendations are suggested:

1. Enhanced recovery pathway after surgery protocol should become the standard practices for all women undergoing cesarean section to improve patients' outcomes and reduce postoperative complications.
2. Develop periodic in-service training programs for all maternity nurses to enhance their knowledge and skills regarding enhanced recovery pathway after surgery protocol in order to be able educate and counsel women about such evidence-based practice.
3. Provide the obstetrics and gynecological department by educational booklet based on the recent relevant literature to enhance maternity nurses' knowledge and practice regarding implementation of ERP protocol for cesarean delivery
4. Health care setting should emphasize the importance of coordination between health care members relating to the application of the evidenced key elements of enhanced recovery pathway after surgery protocol for CS.
5. Further research on a large sample, multicenter studies are needed to provide more solid evidence using different protocols of

management with different evidence-based practices.

Acknowledgement

The researchers would like to thank all post-cesarean women, women's relatives, nurses for their cooperation and participation in conducting the present study. **Also, special thanks** for the in-service physicians for acceptance to participate in given medication prescription according to ERP protocol guideline for control group.

References

Abd Elati I.H & Mostafa A.R. "Effectiveness of Postpartum Enhanced Recovery Pathway Intervention on the Occurrence of Postoperative Complications for Primiparous Women Undergoing Elective Cesarean Section" .IOSR Journal of Nursing and Health Science (IOSR-JNHS), vol. 8, no.01 , 2019, pp. 50-60.

Abd El-Razek, A. **(2018).** Effect of Implementing Clinical Pathway to Improve Child-Birth and Neonatal Outcomes. American Journal of Nursing, 6(6), 454-465.

Abd-El Hamid A (2007). Postoperative complications following cesarean delivery in Zagazig: prevalence and nursing implications. Doctorate Thesis, Department of Obstet. & Gynecol., Faculty of nursing, Zagazig University: P4.

Al-Ghareeb S.A, Ahmad E.R, Al turki H. (2013). Effect of Early Oral Hydration on Post Cesarean Outcomes. Journal of American Science; 9(8). URL: http://www. jofamericanscience. org/ journals/am-sci/am0908/011_19498am0908_70_78.pdf

Betrán AP, Ye J, Moller A-B, Zhang J, Gülmezoglu AM, Torloni MR (2016): The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990- 2014. PLoS ONE; 11(2): e0148343.

Bollag L, Lim G, & Sultan P, (2020); Society for Obstetric Anesthesia and Perinatology: Consensus Statement and Recommendations for Enhanced Recovery after Cesarean. Anesth Analg. Published online November 3, doi: 10. 1213/ ANE.0000000000005257

Caughey AB, Wood SL, & Macones GA, (2018); Guidelines for intraoperative care in cesarean delivery: Enhanced Recovery After Surgery Society Recommendations (Part 2). Am J Obstet Gynecol, 219(6):533-544. doi:10.1016/j.ajog.08.006

Crichton. (2001): Visual Analogue Scale (VAS) .J Clin Nurs, 10(5), 706-60

Crossman. Ashely., 2019 convenient samples for research thoughtCo.com/ convenient sampling- 3026726.

Dehcheshmeh DF, Salehian T, Gangi F, Beigi M (2011). The Effect Of Chewing Sugar Free Gum After Elective Cesarean-Delivery On Return Of Bowel Function In Primiparous Women. QJRMS; 4 (4):16-20 (Farsi).

Dhillon, B. S., Chandhiok, N., & Rao, M. V. V. (2020): Is emergency cesarean section more risky than elective cesarean section in women with previous cesarean section?. International Journal of Reproduction, Contraception, Obstetrics and Gynecology, 7(5), 1881.

El Baz N. (2018): Are the outcomes of clinical pathways evidence-based? A critical appraisal of clinical pathway evaluation research. EEvaluation in Clinical Practice, 2018, 13(6): 925

Eva M, Smith M, & Ahmed S. (2016). Implementation of enhanced recovery after surgery (ERAS) in gynecological oncology; Arch GynecolObstet; 294:137-143.

Gong, Y., Zhang, Q., Qiao, L., Lv, D., Ruan, J., Chen, H., & Shi, G. (2015). Xylitol gum chewing to achieve early postoperative restoration of bowel motility after laparoscopic surgery. Surgical laparoscopy, endoscopy & percutaneous techniques, 25(4), 303-306.

Greco M, Capretti G, Beretta L, Gemma M, Pecorelli N, & Braga M. (2019): Enhanced recovery program in colorectal surgery: a meta- analysis of randomized controlled trials. World journal of surgery; 38(6): 1531-1541.

Hamilton BE, Martin JA & Osterman MJK. Births: Provisional data for 2020. Vital Statistics Rapid Release; no 20. Hyattsville, MD: National Center for Health Statistics. DOI: https://dx.doi. org/10.15620/cdc:116027.

Heeba M F , Nasr E H, Ali H M: Clinical Pathways of Postoperative Nursing Care for Women Undergoing Gynecological Operations at Port Said Hospitals: Port Said Scientific Journal of Nursing, 6(2), December 2019: P.3

Kalogera E, Bakkum-Gamez J, Jankowski C, Trabuco E, Lovely J, Dhanorker S, et al. (2013). Enhanced Recovery in Gynecologic Surgery. ObstetGynecol; 122: 319-28.

Karen M.BradyMSN, APRN-BCDeborah S.KellerMS, MDConor P.DelaneyMD, MCh, PhD, FRCSI, FACS, FASCRS (2018): Successful Implementation of an Enhanced Recovery Pathway: The Nurse's Role, AORN Journal, 102(5): p.469

Khalil A. K.& Shahin H. E. Effect of Nursing Clinical Pathway on Self-Assessment of Fetal Well-being among high risk pregnant women, International Journal of Novel Research in Healthcare and Nursing, Vol. 7, Issue 1, pp: (729- 741), Month: January - April 2020.

Kim, K., Yoo, S., Yang, E. J., No, J. H., Hwang, H., & Kim, Y. B. (2013). Association of nursing- documented ambulation with length of stay following total laparoscopic hysterectomy for benign gynecologic disease. Obstetrics & gynecology science, 56(4), 256-260.

Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. JAMA Surg 2017;152:292–8.

Lucas DN, & Gough KL, (2013); Enhanced recovery in obstetrics--a new frontier? Int J Obstet Anesth. 22(2): 92–5.

Modesitt S, Sarosiek B, Trowbridge E, Redick D, Shah P, Thiele R, Tiouririne M, Hedrick T. (2016). Enhanced recovery implementation in major gynecologic surgeries: effect of care standardaization, ObstetGynecol; 123:457-66.

Mohammed, A., & Shehata, N. (2021). Effectiveness of Instructional Module on Breast Problems among Post Cesarean Section Mothers. *Evidence-Based Nursing Research*, *2*(4), 14. https:// doi. org/ 10. 47104/ ebnrojs3. v2i4.184

Mohan, C. (2018). Assessment of knowledge regarding exclusive breastfeeding among primigravida and primipara mothers, International Journal of Advanced Research and Development, 3(8), 1-36. https://www.ijarnd.com/manuscripts/v3i8/V3I8-1155.pdf.

Mostafa S.,(2019): Enhanced recovery after elective cesarean sections, Department of Obstetrics & Gynecology, Faculty of Medicine, Benha University, Benha, Egypt, ISSN: 2090-7625, November 2019, Vol.9, No. 4

Murphy SL, Mathews TJ, Martin JA, Minkovitz CS, & Strobino DM. Annual summary of vital statistics: 2013e2014. Pediatrics 2017;139. https://doi.org/10.1542/peds.2016-3239.

Naeem, M ., Khan, M ., Abbas , S ., and Usman ,M. (2019): Rate and indication of elective and emergency cesarean section , J Ayub Med Coll Abbottabad , 27(1), 151.

Qiang L., Jia D., and Long Y., (2020): Enhanced recovery after cesarean delivery: a challenge for anesthesiologists, Chinese Medical Journal: March 5, 2020 - Volume 133 - Issue 5 -p 590-596

Reuter, S., Woelber, L., Trepte, C.C. et al. The impact of Enhanced Recovery after Surgery (ERAS) pathways with regard to perioperative outcome in patients with ovarian cancer. Arch Gynecol Obstet (2021). https://doi.org/10.1007/s00404-021-06339-6

Rocha, R. A., Maviglia, S. M., Sordo, M., & Rocha, B. H. (2014). A clinical knowledge management program. In Clinical Decision Support (Second Edition) (pp. 773-817).

Scott MJ, Baldini G, Fearon KC, Feldheiser A, Feldman LS, Gan TJ et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. Acta Anaesthesiol Scand 2020;59:1212–31

Tamang, T., Wangchuk, T., Zangmo, C. et al (2021): The successful implementation of the Enhanced Recovery After Surgery (ERAS) program among caesarean deliveries in Bhutan to reduce the postoperative length of hospital stay. BMC Pregnancy Childbirth 21, 637 (2021). https://doi.org/10.1186/s12884-021- 04105-9

Varadhan KK, Lobo DN, Ljungqvist O. Enhanced recovery after surgery: the future of improving surgical care. Crit Care Clin 2019; 26:527–47.

Vlug M, Bartels S, Wind J, et al (2012). Which fast track elements predict early recovery after colon cancer surgery? Colorectal disease: the official journal of the Association of Coloproctology of Great Britain and Ireland; 14(8):1001-1008.

Wijik L, Franzen K, Ljungvist O, Nilsson K. (2014). Implementing a structured enhanced recovery after surgery (ERAS) protocol reduces length of stay after abdominal hysterectomy. Acta Obstet Gynecol Scand; 93:749-756