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Effect of Pre Operative Educational Guidelines on Postoperative Health Outcomes of Patients Undergoing Cervical Spine Surgery

Samar Faltas Marzouk Faltas [1], Asmaa Hamdi Mohamed[2]
[1]*Lecturer in Medical-Surgical Nursing, Faculty of Nursing - Ain Shams University, Egypt*
[2]*Assistant professor in Medical-Surgical Nursing, Faculty of Nursing - Ain Shams University, Egypt*
Corresponding Author; Samar Faltas Marzouk Faltas

ABSTRACT*: Cervical spine surgery is both a lifesaving procedure and a life-changing event. Individual responses to cervical disorders are varied and complex, and are influenced by a range of personal, clinical, social, physical and environmental factors. Aim: The aim of this study is to evaluate the effect of educational guidelines on postoperative health outcomes of cervical spine surgery patients. Study design: a quasi-experimental study (Control and study groups; pre-test-post-test design). Subject: A purposive sample of sixty patients undergoing cervical spine surgery was recruited from neurosurgical units at Ain Shams University Hospital. Tools for data collection: six tools were used; self-administered patients' knowledge assessment questionnaire, patients' post cervical spine surgery practice observational checklists, visual-analog scale (VAS), pain catastrophizing scale (PCS), neck disability index (NDI) and short form-36 (SF-36). The results: This study found that, the majority of the cervical spine surgery patients had unsatisfactory level of knowledge and practice pre implementation of the educational guidelines that significantly improved post implementing the guidelines. Moreover, all patients showed significant improvement in all health-outcomes three months after surgery with mean changes between pre and post three months for NDI, VAS, PCS and F-36 scores were -14.41±12.09, -3.34±2.67, 7.24±9.01, 25.38±8.02 respectively. Conclusion: This study concluded that the educational guidelines had positive effect on cervical spine surgery patients' postoperative health outcomes. Recommendation: The study recommended conducting a standard rehabilitation programs for improving cervical spine surgery patients' life style.*

KEY WORDS:*Cervical spine surgery, Health outcomes, Patient guidelines.*

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I. Introduction

Cervical spine surgery is indicated for a variety of spinal neck problems that produce pressure on the spinal cord or on the nerves coming from the spine. Generally, surgery may be performed for degenerative disorders, trauma or instability. In degenerative disorders, the discs or cushion pads between the vertebrae shrink, causing wearing of the disc, which may lead to herniation. This degeneration can cause pain, numbness, tingling and weakness from the pressure on the spinal nerves) (Albert, 2018).

Patients with a deformity in their cervical spine, such as hyperlordosis or swan neck deformity may benefit from surgery to straighten and stabilize the spine. Since the neck is so flexible it is vulnerable to injury, some injuries can cause a fracture and or dislocation of the cervical vertebra. In a severe injury, the spinal cord may also be damaged. Patients with a fracture, especially with spinal cord damage, undergo surgery to relieve pressure on the spinal cord and stabilize the spine (Priscilla **&** Karen, 2014).

Cervical spine surgery is generally performed on an elective basis for decompression of the spinal cord or fusion in case of spinal instability. The two types of procedures are often combined, as a decompression may de-stabilize the spine and create the need for a fusion to add stability. Spinal instrumentation such as a small plate can also be used to help add stability to the spinal construct (Peter, 2010).

The cervical spine can either be approached from the front (anterior approach) or from the back (posterior approach). In general, where possible, most surgeons favor an anterior approach for most conditions. An anterior approach results in less disruption of the normal musculature and is also easier to maintain the normal alignment of the spine. For example, many degenerative conditions of the spine cause a loss of the normal lordosis (gentle curvature of the spine); however, by opening up the front of the spine, this lordosis can be reestablished. With that said, there are some conditions that do require a posterior approach or a combined anterior/posterior approach (Higashiyama, Sugawara & Mizoi, 2014).

Anterior cervical discectomy and fusion (ACDF) is a type of neck surgery that involves removing a damaged disc to relieve spinal cord or nerve root pressure and alleviate corresponding pain, weakness, numbness, and tingling. A discectomy is a form of surgical decompression, so the procedure may also be called

an anterior cervical decompression (Kevin, 2016). Laminectomy was long the preferred technique for decompressing degenerative conditions at the cervical spine, such as protrusions of the intervertebral disc, frank disc herniations, and spinal stenosis. The advent of the anterior approach and surgical techniques to the cervical spine offered the surgeons the ability to directly address the pathologic processes that primarily originated from the anterior spine. As a result, anterior approaches are generally preferred when the pathology is anterior (Vincenzo & Alberto 2011).

Preoperative impaired functional status and postoperative pain control are important aspects in the management of surgical patients and are related to a successful recovery and patient satisfaction. Postoperative pain management has often been described as suboptimal; it has been reported that in only one-quarter of the 23 million procedures performed in the Arab world annually did the patients receive adequate pain control (WHO, 2013 as cited in Ahmad, et al., 2017).

Nurse should continually reassess the patient's abilities and need for assistance with self-care activities. The patient may need total care initially. As soon as the patient is able, begin preparing him or her for self-care activities with the patient's expected abilities. During rehabilitation, the patient must learn to use specialized equipment and strategies to be as independent as possible in self-care (Linton, 2016).

Preoperative patient education (PE) has been used by many institutions to deal with patient anxiety, pain control, and overall satisfaction (Ahmad, et al., 2017). Educating the patient is crucial before installing any treatment. In modern times, information can be gained through many resources, but the treating medical team is still very important. It has been shown that, fulfillment of preoperative expectations is related to the highest post-operative satisfaction. A mismatch of disease understanding and expectation between treating medical team and patient might result is a less than favorable outcome according to the patient (Mannion et.al., 2009; Soroceanu, Ching, Abdu & McGuire, 2012).

II. Significance of the study

From the researchers' observation and reviewing related researches, it was found that, many patients with chronic illnesses struggle to rebuild a positive health outcome after diagnosis while attempting to find a balance between their current physical status and their ongoing social duties. Fear of the unknown e.g. pain and impaired functional status is expected when patients are admitted for a surgical procedure, and patients may feel vulnerable and have significant perioperative anxiety. Many institutions to deal with patient's anxiety, pain control, functional status and overall satisfaction have used patient education (PE). Several authors have found PE to be beneficial, whereas others found little or no significant improvement (Ahmad, et al., 2017). Therefore, this study was conducted to study the effect of implementing preoperative educational guidelines for patients undergoing cervical spine surgery on their postoperative health outcomes.

III. Aim of the study

This study was conducted to evaluate the effect of preoperative educational guidelines on postoperative health outcomes of patients undergoing cervical surgery through the following:

- Assessing preoperative patients' level of knowledge and practice regarding cervical spine surgery and post cervical spine surgery self-management.
- Developing and implementing educational guidelines for patient undergoing cervical spine surgery.
- Evaluating the effect of preoperative educational guidelines on postoperative health outcomes of patients undergoing cervical spine surgery.

Research hypotheses: This study hypothesized that, "Postoperative health outcomes of patients undergoing cervical spine surgery will improve after providing preoperative educational guidelines"

IV. Material and Methods

Study design: a quasi-experimental design was utilized to conduct this study.

Subject: A purposive sample of sixty adult preoperative cervical spine surgery patients, without any neurological, mental, or psychological disorders and not received any educational program regarding cervical spine surgery were recruited from neurosurgical units at Ain Shams University Hospital. The sample size was calculated based on the following equation:

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

n = required sample size

t = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of the problem among patients.

m = margin of error at 5% (standard value of 0.05)

Patients were randomly assigned into two equal groups (control and study) 30 patients for each group.

Tools for data collection: Six tools were used to collect data as follow:

Tool 1: Patients' self-administered knowledge assessment questionnaire:

This questionnaire was developed by the researchers in Arabic language after reviewing the related literatures (Godil, Parker, Zuckerman, Mendenhall, & McGirt, 2013; Li, & Dai, 2011; McCormick, Werner, & Shimer, 2013; Seacoast Orthopedic & Sport Medicine, 2009).

This tool was consisted of two parts as follow:

- **Part A** is concerned with the demographic characteristics of patients such as: age, gender, qualification..... etc.
- **Part B** is concerned with assessment of patients' knowledge regarding cervical spine surgery and its management e.g. indications for cervical surgery, types of surgeries, complications, and post operative self-management. It consists of 40 MCQ questions. The questionnaire was testes for reliability using test-retest reliability; the correlation coefficient value was 0.94.

The Scoring system: every correct answer was given one score and zero was given for every wrong answer. The total scores for all the questionnaire was 40 degrees. The total scores for every patient were summed up and converted into a percentage. The total scores for every patient were categorized as follow:

- Less than 60% was considered unsatisfactory level of knowledge.
- Equal or more than 60% was considered satisfactory level of knowledge.

Tool 2: Patients' post cervical spine surgery practice observational checklists:

These checklists were developed by the researchers after reviewing the related literatures (Godil, Parker, Zuckerman, Mendenhall, & McGirt, 2013; Li, & Dai, 2011; McCormick, Werner, & Shimer, 2013; Seacoast Orthopedic & Sport Medicine, 2009).

It consists of two parts as follow:

- **Part A:** post operative activity including: spinal precautions (6 items), bed positioning (6 items), bed mobility; getting in/out of bed (12 items), transfers in/out of chair (9 items), transfer in/out of car (12 items),transfer in/out of commode (8 items), using a walker (9 items), using stairs (6 items), neck brace (4items), and activity of daily living (18 items). Overall test-retest reliability coefficients were Cronbach's alpha values of 0.92
- **Part B:** post operative exercise including:
  - Posture and body mechanics (21 items)
  - Exercises 1-2 week which includes exercises for shoulder shrugs (2 items), scapular retraction (2 items), horizontal shoulder stretch (2 items), and walking (2 items)
  - Exercises 3-12 weeks which includes exercises for scapular retraction progressive phase (6 items), active shoulder flexion (6 items), active shoulder abduction (6 items), chair push-ups (6 items), wall Push-ups (6 items), corner stretch (6 items), triceps stretch (6 items), horizontal shoulder stretch (6 items), and walking (6 items).

The scoring system for performance checklist: (1) mark was given for done and (zero) for not done. Total score of performance test was (173) .The points were summed and converted into a percentage scoring, the total scoring system was classified as, unsatisfactory level (<60%), satisfactory level (>60%).

Tool 3: Visual-Analog Scale (VAS):

This scale is self-reported numerical scale; it was used to assess pain intensity **(Huskisson, 1974)**. The VAS is a continuous scale comprised of a horizontal line, usually 10 centimeters in length, that instructs the patient to point to the position on the line to indicate how much pain they are currently feeling. The far left end indicates "no pain" and the far right end indicates "worst pain ever." Test–retest reliability has been shown to be good (r = 0.92).

Scoring system: The scores of this scale ranges from 0 to 10 for pain. Zero signifies no pain, while 10 represents intolerable pain i.e. a higher score indicates greater pain intensity.

Tool 4: Pain Catastrophic Scale (PCS):

This scale is adopted from **Sullivan (1995)** to determine how patients experience pain, and to indicate the degree to which they experienced each of 13 thoughts or feelings when experiencing pain, on 5-point scales with the end points (0) not at all and (4) all the time. The PCS yields a total score and three subscale scores assessing rumination (e.g. "I can´t stop thinking about how much it hurts"), magnification (e.g. "I´m afraid that something serious might happen"), and helplessness (e.g. "There is nothing I can do to reduce the intensity of my pain"). The PCS has been tested for reliability using Alpha Cronbach' test. It has been shown to have adequate to excellent internal consistency (coefficient alphas: total PCS = 0.87, rumination = 0.87, magnification = 0.66, and helplessness = 0.78).

Scoring system: The PCS total score is computed by summing responses to all 13 items. PCS total scores range from 0 – 52. The PCS subscales are computed by summing the responses to the following items:

Rumination: Sum of items 8, 9, 10, 11
Magnification: Sum of items 6, 7, 13
Helplessness: Sum of items 1, 2, 3, 4, 5, 12

Tool 5: Neck Disability Index (NDI):

This tool was adopted from **Vernon and Mior (1991))**. It was used to give information about how patients' neck pain has affected his/her ability to manage in everyday life. It consists of 10 sections (Pain intensity, personal care (washing, dressing ...etc.), lifting, reading, headaches, concentration, work, driving, sleeping and recreation. Each section includes (6)statements/responses. The NDI has been tested for reliability using Alpha Cronbach' test. The coefficient alphas value = 0.91.

Scoring system: The responses of each of the (10 items) is scored from 0 - 5. The maximum score is therefore 50. The higher scores reflect increased disability.

Tool 6: Short Form-36 (SF-36):

This questionnaire was adopted from **Ware and Sherbourne** (1992), and used to primarily evaluate patients' health status. It involves eight scales; physical functioning (10 statements), role functioning/physical (4 statements), role functioning/emotional (3 statements), energy/fatigue (4 statements), emotional well-being (6 statements), social functioning (2 statements), pain (2 statements), and general health (5 statements). The scale test-retest reliability was used to test tool reliability, the correlation coefficient was excellent (r =0.91).

Scoring system: This questionnaire is consisted of 36 statements, which were grouped to four subgroups according to answer response for statements as follows:

- **Subgroup one**: includes 19 statement and response were on scale of 2 ("Yes" or "No") for physical function (10 statements), role function/emotional (3 statements), and emotional well-being (6 statements).
- **Subgroup two**: includes 4 statements and response were on scale of 3 answers ranges from "Yes limited" to "No not limited at all" for role functioning/physical.
- **Subgroup three:** includes 9 statements and response were on scale of 5 answers ranges from "Not at all" to "Extremely severe" or "Poor" for social functioning (2 statements), pain (2 statements), and general health (5 statements).
- **Subgroup four:** includes four statements and response were on scale of 6 answers ranges from "All of them" to "Not all of them" for energy/fatigue.

The scores of the items in each subgroup were summed-up and the total score was 92 degrees, divided by the number of items, giving a total mean score for the Short Form-36.

A total score is yielded ranging from 0-92. The higher scores reflect favorable and better health status.

Tools validity and reliability:

- **Tool validity:** The developed tools were tested for face and content validity through seven experts from medical surgical nursing department, Faculty of Nursing, Ain Shames University. They were requested to give their opinion regarding the tool's content, accuracy, relevancy and appropriateness to the research objective. Finally minimal modifications were done to meet the jury opinion. Both of the third, fourth, fifth and sixth tools were translated into Arabic language and retranslated into English to assure its accuracy.
- **Tool reliability:** the developed tool was tested for the reliability by using test-retest reliability and correlation coefficient value was determined.

Patient's educational guidelines: An educational booklet in Arabic language was developed by the researchers based on recent medical and nursing literatures **(Advanced Spine & Joint Institute, 2016; Aim Specialty Health, 2017; Johns Hopkins Medicine Orthopedic Surgery, 2017; and Priscilla** & **Karen, 2014),** it gives the patient insight about cervical spine surgery, causes, how operation done, complications, guidelines regarding pre and post operative self-management and care, discharge instructions and post operative activity and exercises.

Administrative Design: Letter for explaining the aim of the study and requesting the study conduction approval was issued from the Faculty of Nursing, Ain Shams University to the administrators of the neurosurgical unites at El-Demerdash surgical hospital to obtain their permission.

Ethical Considerations: The research approval was obtained from the faculty of nursing research ethics committee before initiating the study. The researchers clarified the purpose and aim of the study to patients undergoing cervical spine surgery included in the study. Oral consent was obtained from patients to ensure willingness to participate in the study. The researchers maintained anonymity and confidentiality of patients' data. Patients were informed that they are allowed to withdraw from the study at any time without penalty.

Pilot study: A pilot study were carried out on 10% of the total number of the study sample to test the applicability and feasibility of the study and clarity and efficacy of the tools in addition to the time needed to fill the tools in. The tools were modified according to the results of the pilot study. Those patients included in the pilot study were excluded from the study.

Field work: Field work included three phases; preparatory phase, implementation phase and evaluation phase.

A. Preparatory phase:

- The researchers developed the first and second tools as well as the educational guidelines after reviewing the recent and related literatures.
- Tools were tested for validity and reliability. Essential modifications were done accordingly.
- The standardized tools (Tools 3, 4, 5 and 6) were translated into Arabic language and retranslated into English to assure their accuracy and also, tested for validity and reliability.

B. Implementation phase: Once the approval was obtained to carry out the study, the researchers started to select the target patients, collected data and implement the educational guidelines as follow:

- This phase started preoperatively by interviewing 60 preoperative patients undergoing cervical spine surgery in neurosurgical departments individually to explain the aim and nature of the study as well as taking their approval to participate in the study prior to data collection.
- Data collection for this study was carried out in the period from the half of January 2018 to the end of June 2018.
- The researchers were available in the morning and the afternoon shift four days per week by rotation.
- Those who agreed to participate in the study were randomly assigned into two groups; control and study groups.

Assessment sessions:

- Preoperatively, every patient in the two groups was interviewed by the researchers to collect the data of the knowledge assessment questionnaire. The questionnaire was filled in within 15 minutes for each patient.
- Every patient in the two groups was observed preoperatively while practicing postoperative activities and exercise as requested from him/her as if he/she will practice them postoperatively to assess his/her needs and to be used for comparison with postoperative practices, using the developed observational checklists. The observation took about 60 minutes for each patient to be completed.
- Patients' health outcomes assessment tools (VAS, PCS, NDI & SF36) were filled in by the researchers within 20 minutes for every patient in the two groups.

Educational guidelines sessions:

- Preoperatively, the patients of the study group were assigned to groups of two to three patients.
- Sessions for providing the educational guidelines were conducted for the study group prior to the operation; both theoretical and practical sessions starting with orientation about the educational guidelines purpose, time and content were done using simple words and a tone of voice that shows interest, concern and friendliness.
- The educational sessions were carried out at the neurosurgical units over two to three days for every three to four patients together according to their level of education, understanding and their condition. The educational guidelines were provided through small group discussion, demonstration and the developed booklet, in addition to audiovisual materials and real materials as neck collar and walker for practical part. The researchers presented these sessions by rotation.

- The 1st session was directed toward theoretical knowledge content about cervical surgery, types, causes, and complications. It was provided in about 20 minutes.
- Hospital cares which including: the day of surgery, what to expect after surgery, post-op routine, understanding pain management, discharge plans and expectations. It was provided in about 20 minutes.
- The 3rd session was directed toward application of post-operative activities. It was provided in about 45 minutes and including spinal precautions, bed positioning, bed mobility (getting in/out of bed), transfers (in/out of chair, car and commode), using a walker, using stairs, neck brace, and activities of daily living.
- The 4th session was directed toward application of post operative exercises it was given in about 45 minutes and including post-operative exercise; 1st and 2nd Week and 3rd to 12th Week postoperative.
- The 5th session was directed toward theoretical knowledge content about:
  - Post-operative care including: control discomfort, body changes, caring for incision, and post-operative complications. It was provided in about 20 minutes.
  - Discharge Instructions for cervical spine surgery. It was provided in about 30 minutes.

- The 6th session was directed toward application of body mechanics including: standing, bending, turning, lifting/reaching, push/pulling, sleeping, around the house, and do's and don'ts. It was provided in about 30-45 minutes.
- Patients were handled the developed educational booklet, with explanations from the researchers regarding its use.
- The control group did not receive any education preoperatively.

C. Evaluation phase:

- Three months postoperatively, the effectiveness of the educational guidelines was evaluated using the same previously used assessment tools for assessment of knowledge, practice and health outcomes of both the control and study group to compare between them.

Statistical analysis: All the collected data were coded, tabulated and subjected to statistical analysis. Statistical analysis was performed with SPSS version 20.. Qualitative categorical variables are described by percentage and proportions. The Chi-square test (X^2) was used for comparisons regarding qualitative data between the study and control groups, while the Pearson correlation coefficient test (r) is used for quantitative variables.

V. Results:

Regarding demographic characteristics of the studied patients in the study and control groups, table 1 shows that, the mean age of the study group was 57.53±2.98, while the mean age of control group was 54.50±13.29 with no statistically significant difference between them. Regarding patients' gender, it was found that, 86.7% of patients in the study group were females, while 76.7% of patients in control group were females and all of patients in both control and study group were married with no statistically significant differences between the two groups regarding gender or marital status. As regards the occupation, 46.7% of the patients in the study group and 53.3% of patients in the control group were office workers. As regards type of surgery, 76.7% of patients in the study group and 86.7% of patients in the control group undergoing cervical laminectomy surgery, with no statistically significant differences between both groups.

By comparison between the number of patients with satisfactory level of knowledge in the study and control groups pre implementation of the educational guidelines, table 2 reveals that, there are no statistically significant differences between numbers of patients who have satisfactory level of knowledge regarding all items of the knowledge in both groups pre implementation of the educational guidelines. While, three months post implementation of the guidelines, there are statistically significant differences between numbers of patients who have satisfactory level of knowledge related to cervical spine surgery, preoperative preparation and postoperative care and complications and highly significant difference between them regarding knowledge related to post operative activities, exercises and discharge instructions.

Table 3 illustrates comparison between the number of patients with satisfactory level of knowledge in the study group pre and three months post implementation of the educational guidelines. It is clear from this table that, there are highly statistically significant differences between them regarding all items of the knowledge.

Table 4 shows that, there were no statistical significant differences between the number of patients who have satisfactory level of practice in all items of cervical spine practice between both study and control group pre implementation of the educational guidelines. In contrast, post implementation of the guidelines, there were highly statistically significant differences between the number of patients who have satisfactory level of practice in all items of post operative activity between study and control group ($P<0.001$), while there were statistically significant differences between the number of patients who have satisfactory level of practice in all items of post operative activity between study and control group ($P<0.05$).

Table 5 reveals that, there were no statistical significant differences between the study and control groups regarding their total knowledge and practice pre implementation of the educational guidelines (p value >0.05). While, the same table also reveals that, there were highly statistical significant differences between them regarding their total knowledge and practice three months post implementation of the educational guidelines (p value <0.001).

Table 6 illustrates that, patients in study group showed obvious improvement in all items of the postoperative health outcomes three months after surgery with the mean changes between pre and three months post for NDI, VAS, PCS and F-36 scores were -14.42±12.09, -3.34±2.67, 7.24±9.01, and 25.38±8.02 respectively. On the other hand, there are slight improvement in all items of the postoperative health outcomes among the control group with minimal changes in the mean scores of NDI, VAS, PCS and F-36 scores (-3.7±0.18, -1.2±0.38, 3.57±0.06, and 1.83±2.41 respectively).

Table 7 presents the correlation between the study group patient's total level of knowledge and practice and their postoperative health outcomes three months after implementing the educational

guidelines. It reveals a positive correlation between the patients' total level of knowledge and practice and all of their postoperative health outcomes with a statistical significance.

Table no .1. Demographic characteristics of the studied patients

Characteristics	Study (N=30)		Control (N=30)		X^2	P Value
	N	%	N	%		
Age group (years):					1.43	0.69 NS*
30 < 45	6	20	5	16.7		
45 < 60	24	80	25	83.3		
Mean ±SD	57.53±2.98		54.50±13.29			
Gender:					1.7	0.19 NS*
Male	4	13.3	7	23.3		
Female	26	86.7	23	76.7		
Types of Surgery:					0.127	0.72 NS*
Cervical laminectomy Laminectomy Laminectomy	23	76.7	26	86.7		
Cervical Fusion	7	23.3	4	13.3		
Occupation:					1.28	0.52 NS*
Private work	10	33.3	9	30.0		
Office work	14	46.7	16	53.3		
House wife	6	20	5	16.7		
Marital Status:					2.85	0.41 NS*
Single	0	0	0	0		
Married	30	100	30	100		

*NS Non significant at P value > 0.05

Table no. 2: Comparison between study and control groups regarding number of patients with satisfactory level of knowledge pre and three months post implementation of educational guidelines

Items of knowledge	Pre				X^2	P value	Post				X^2	P value
	Study		Control				Study		control			
	No	%	No	%			No	%	No	%		
• Cervical spine surgery and pre-operative preparations.	4	13.3	2	6.7	0.802	0.370 NS*	22	73.3	2	6.7	0.934	0.002 S**
• Postoperative care and complications.	2	6.7	2	3.3	0.355	0.552 NS*	21	70	3	10	8.333	0.004 S**
• Post operative activities, exercises and discharge instructions.	3	10	0	0.0	0.433	0.511 NS*	24	80	0	0.0	30.645	<0.001 HS***

*NS Non significant at P value > 0.05 **;** **S Significant at P value ≤ 0.05**;** ***HS Highly significant at P value ≤ 0.001

Table no. 3: Comparison between number of patients with satisfactory level of knowledge in the study group pre and three months post implementation of the educational guidelines

Items of knowledge	Pre		Post		X^2	P-value
	No	%	No	%		
• Cervical spine surgery and pre-operative preparations.	4	13.3	22	73.3	25.785	<0.001 HS*
• Postoperative care and complications.	2	6.7	21	70	16.095	<0.001 HS*
• Post operative activities, exercises and discharge instructions.	3	10	24	80	20.513	<0.001 HS*

*HS Highly significant at P value ≤ 0.001

Table no. 4: Comparison between study and control groups regarding number of patients with satisfactory level of knowledge pre and three months post implementation of educational guidelines

Items of Practice	Pre				X^2	P value	Post				X^2	P value
	Study		Control				Study		Control			
	No	%	No	%			No	%	No	%		
Post operative activity:												
• Spinal precautions	1	3.3	0	0.0	1.020	0.312 NS*	27	90	0	0.0	21.429	<0.001 HS***
• Bed positioning	5	16.7	3	10	0.355	0.552 NS*	26	86.7	6	20	19.532	<0.001 HS***
• Bed mobility; getting in/out of bed	1	3.3	0	0.0	1.020	0.312 NS*	30	100	0	0.0	29.066	<0.001 HS***
• Transfers in/out of chair	4	13.3	2	6.7	1.433	0.698 NS*	24	80	2	6.7	23.529	<0.001 HS***
• Transfer in/out of car	0	0.0	0	0.0	_	**NA**	23	76.7	0	0.0	16.874	<0.001 HS***
• Transfer in/out of commode	6	20	5	16.7	0.127	0.721 NS*	30	100	8	26.7	30.563	<0.001 HS***
• Using a walker	4	13.3	3	3.3	1.7	0.192 NS*	26	86.7	3	3.3	23.867	<0.001 HS***
• Using stairs	10	33.3	7	23.3	1.28	0.528 NS*	21	70	9	30	15.909	<0.001 HS***
• Neck brace	12	40	14	46.7	2.85	0.415 NS*	28	93.3	14	46.7	27.259	<0.001 HS***
• Activity of daily living	4	13.3	1	3.3	1.685	0.194 NS*	30	100	5	16.7	29.114	<0.001 HS***
Post operative exercise:												
• Posture & body mechanics	0	0.0	0	0.0	_	**NA**	21	70	3	10	6.566	0.038 S**
• Exercises 1st & 2nd week	2	6.7	1	3.3	2.083	0.149 NS*	26	86.7	6	20	6.794	0.033 S**
• Exercises 3rd to 12th weeks	1	3.3	0	0.0	-	**NA**	23	76.7	1	3.3	6.098	0.047 S**

*NS Non significant at p > 0.05; **S Significant at P ≤ 0.05; *** HS Highly significant at P ≤ 0.001

Table no. 5: Comparison between study and control groups regarding their knowledge and practice pre and three months post implementation of educational guidelines

	Items		Study (n=30)		Control (n=30)		X^2	P value
			No	%	No	%		
Pre	Total Knowledge	Satisfactory	3	10	2	6.7	0.46	> 0.05* NS
		Unsatisfactory	27	90	28	93.3		
	Total Practice	Satisfactory	4	13.3	3	10	0.72	> 0.05* NS
		Unsatisfactory	26	86.7	27	90		
Post	Total Knowledge	Satisfactory	28	93.3	2	6.7	17.647	< 0.001** HS
		Unsatisfactory	2	6.7	28	93.3		
	Total Practice	Satisfactory	29	96.7	6	20	18.435	< 0.001** HS
		Unsatisfactory	1	3.3	24	80		

*NS Non significant at p > 0.05; ** HS Highly significant at P ≤ 0.001

Table no. 6: Patient-reported outcomes (NDI, VAS, PCS, and F36) in control and study groups at pre and 3 months post-surgery, and change in outcome scores

Patient-reported outcomes		Pre		Post 3 months		Change	
		Mean	SD	Mean	SD	Mean	SD
Study	**NDI** (50)	29.24	13.94	14.82	11.81	-14.42	12.09
	VAS (10)	5.06	2.64	1.72	1.96	-3.34	2.67
	PCS (52)	36.98	7.13	44.22	9.71	7.24	9.01
	SF-36 (92)	47.82	7.93	73.20	7.54	25.38	8.02
Control	**NDI** (50)	25.20	1.095	21.50	1.28	-3.7	0.18
	VAS (10)	6.93	1.46	5.73	1.08	-1.2	0.38
	PCS (52)	35.93	1.57	39.50	1.63	3.57	0.06
	SF-36 (92)	45.46	12.57	47.29	12.16	1.83	2.41

NDI Neck Disability Index; PCS, Pain catastrophizing Scale; SF-36 the Short Form of the SF-36; VAS Visual Analog Scale.

Table no. 7: Correlation between study group's total level of knowledge and practice and their postoperative health outcomes post implementation of educational guidelines

Items	test	NDI	VAS	PCS	SF-36	Total
Total Knowledge	**r**	0.351	0.461	0.339	0.868	0. 652
	p	0.000	0.000	0.016	0.000	<0.001
Total Practices	**r**	0.364	0. 391	0.369	0.718	0.556
	p	0.003	0.005	0.008	<0.001	<0.001

VI. Discussion

By comparing between the study and control groups regarding the demographic characteristics, it was found that, there were no significant differences between them regarding age, gender, occupation, marital status and type of surgery. The results revealed that the highest percentage of patients were in the age group between 45and less than 60 years old and female this finding is incongruent with the study done by (Omidi-Kashani, Ghayem & Ghandehari, 2014) entitled " Impact of age and duration of symptoms on surgical outcome of single-level microscopic anterior cervical discectomy and fusion in the patients with cervical spondylotic radiculopathy" who stated that, mean age of the study sample was 43.7±15.0 years and Two-thirds of them were female.

These findings seem to be logic due to the physiological changes as a result of aging process leads to muscle weakness as well as neurological disorders. Also, this age group might be subjected to much work and effort and their disease is an accumulative consequence to this effort, also around half of the studied two groups are office workers therefore, they are prone to cervical disc due to the nature of their work either working at a desk on computer or writing for a long time without maintaing good body posture.

The study result related to occupation is not in the same line with the result of the study done by Parker et.al. (2013) entitled "Assessment of the minimum clinically important difference in pain, disability, and quality of life after anterior cervical discectomy and fusion" who reported that, the majority of patients had a private work. From the researchers' point of view, this may be due to that majority of the sample was females.

Concerning types of surgery, the results revealed that, the most prevalent surgery type in the two studied groups was cervical laminectomy. This finding is congruent to some extent with the result of a study done by Nasser et al. (2010) entitled " Complications in spine surgery "who stated that 60% of the cervical spine surgery were cervical laminectomy, and 40% were Cervical Fusion.

Concerning the studied patients' knowledge regarding cervical spine surgery, postoperative care, exercises and activities and discharge instructions pre implementation of the educational guidelines, most of the two studied groups had unsatisfactory knowledge with no difference between both of them, this may be due to lack of the provided education from the health care members before the operation as all the studied patients are undergoing this operation for the first time.

While three months after implementation of the educational guidelines for the study group, there was an improvement in knowledge level for this group and there was difference between the study and control groups' level of knowledge. This could be due to the clarity and simplicity of the guidelines provided to the study group and the comprehensiveness of its content that is based on the patients' needs, in addition to its relevance to the patients' condition.

Concerning patients' practice, the results of the present study showed that, the majority of patients in the study and control group had unsatisfactory level of practice regarding postoperative exercises and activity for cervical spine surgery before implementing of nursing guidelines. While after implementing the educational guidelines for the study group and evaluating the two groups three months postoperative, there were differences between them regarding postoperative activity including precautions, bed positioning, getting in and out of bed, transfer in and out of chair, car

and commode, using walker and stairs and activity of daily living. This difference between the two groups postoperatively refers to the effect of the education they received before the operation through guidelines.

This finding is supported by the study done by Grzegorz (2016) titled " Quality of life of patients after surgical treatment of cervical spine metastases" and the study done by Asilioglu and Celik (2004) entitled " The effect of preoperative education on self-management of cervical spine surgery patients " who mentioned that implementation of training improve nurses' practice and ensure continued quality of care which have positive effect on improving patient quality of life.

The current study results revealed presence of difference between the study and control groups regarding practicing postoperative exercises that should be done at the first and second postoperative week and exercises of the third to twelfth postoperative week in addition to exercise related to posture and body mechanics. This finding may be owing to the effectiveness of the educational guidelines that involves a practical part related to activity and exercises. This is supported by the study done by (Chapman et. al, 2011) titled "Evaluating common outcomes for measuring treatment success for cervical spine pain "who stated that guidelines increase amputee patients' orientation by their condition and how to increase their activity.

The improvement in the study group's knowledge and practice level is on the same line with the results of the study done by Fitzpatrick and Hyde (2006) entitled "Nurse-related factors in the delivery of preoperative patient education" and the study done by Ioannis, Roberta, Nicole, Cathleen and Antonio (2011) entitled "Effects of preoperative education on spinal surgery patients "who stated that the significant improvement in patients' knowledge after using learning programs strengthen their skills and update their knowledge.

This study also clarified that, there was an obvious improvement in study group patients' health outcomes (NDI, VAS, PCS, and SF-36) post implementation of educational guidelines. This finding is in accordance with the study done by DeVine et al. (2011) titled "Evaluating the correlation and responsiveness of patient-reported pain with function and quality-of-life outcomes after spine surgery" and the study done by Garrett, Schmidt, Mackintosh, and Fitzpatrick (2002) titled "Quality of life measurement: bibliographic study of patient assessed health outcome measures" who found in their study that, health outcomes had improved as influenced by a direct education and training.

This result may be due to that, the educational guidelines involve instruction related to exercise, moving safely, and getting in and out of bed while protecting the neck and back. Compliance with these instructions are useful to strengthen the neck muscles, decreasing pain intensity and consequently improving pain experience, performance of daily activities and improving health status, because all the measured health outcomes are interrelated and are affected with each other. The current study revealed positive relation between the studied patients' knowledge and practice and their health outcomes three months post implementing the educational guidelines. From the researchers' point of view, this result reflects the effect of improvement in knowledge and practice on improving the health outcomes.

After discussing the findings of the current study, all the projected results reveal that, the research hypothesis has been clearly proved as the postoperative health outcomes of patients undergoing cervical spine surgery had been improved after providing preoperative educational guidelines

VII. Conclusion & Recommendations

Conclusion: from the study results, it can be concluded that, implementation of educational guideline has a positive effect on improving the knowledge, and practice of patients undergoing cervical spine surgery consequently had led to improvement on postoperative health outcomes of those patients.

Recommendations: this study recommended providing educational guidelines for cervical spine surgery patients in hospitals to be included in the routine pre-operative and post-operative nursing care for patients undergoing cervical spine surgery. It is also important to be included in the curriculum of the faculty of nursing. This would decrease the incidence of complications, improve patients' outcomes, and reduce hospital length of stay. More researches are needed to investigate the effectiveness of these guidelines on other health outcomes and in the hospital stay.

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