Assessment of Nurses' Knowledge and Practice Regarding Care for Patients with Spinal Cord Injury in the Critical Care Unit

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Abstract

Background: Spinal cord injury is a damage in the spinal cord that communication between brain and the rest of the body is disrupted, resulting in a loss of movement and sensation from below the level of injury. Damage to the spinal cord can be caused by a trauma like an accident, or as a result of infection or disease. **Aim This study was** to assess the nurses' knowledge and practice regarding caring for patients with spinal cord injury in critical care unit. **Research design:** A descriptive exploratory design, utilized for the conduction of the study, setting conducted at general intensive care unit and neurological intensive care unit in Ain Shams University hospital. Study sample: A purposive sample of 50 nurses. Tools: Two tools were used for data collection were 1) nurses self-administered questionnaire sheet. It included two parts. part one concerned with the assessment of the demographic characteristics of the studied nurses and part two concerned with nurses knowledge questionnaire regarding caring for patients with spinal cord injury.2) Nurses' observational check list about nursing practice for patients with spinal cord injury to assess nurses practice. **Results;** the result of the study showed that 54% of the studied nurses had satisfactory total knowledge regarding caring for patients with spinal cord injury in critical care unit and 58%of the studied nurses had an un satisfactory level of total practice regarding caring for patients with spinal cord injury in critical care unit, the study finding revealed that there was statically significant relation between nurses knowledge and their level of practice regarding caring for patients with spinal cord injury. **Conclusion:** the current study concluded that the studied nurses' knowledge and practice had statistically significant relation between total knowledge and practice. **Recommendation:** recommended health care setting should provide in-service educational programs and upgrading courses based on evidence based guidelines to improve the nurses knowledge and practice among patients with spinal cord injury in critical care unit.

Introduction:

Spinal cord injury is a damage to any part of the spinal cord or nerves at the end of the spinal canal, often causes permanent changes in the strength, sensation, and other body function below the site of the injury. Many research studies are on-going around the world, in the meantime, treatments and rehabilitation allow many people with spinal cord injuries to lead productive, independently lives **(Chhabra, 2015).**

There are two kinds of spinal cord injury complete and incomplete, in a complete injury: the cord there are no function below the level of injury .There

is no sensation or voluntary movement. In an incomplete injury, there is some functioning below the level of injury, means that the ability of the spinal cord to convey massages to or from the brain not completely loss . the absence of motor and sensory function below the injury area does not necessarily mean there are no remaining intact axons or nerves crossing the injury site, just that they are not function appropriately as a result of the trauma **(Burns, 2014).**

There is found type of injury according to the location of spinal cord injury such as cervical injury at C1-C8 that cause paralysis in both arms and both legs ,Thoracic injury was at T1-T12 that cause paralysis or weakness of the both legs and loss bowel and bladder function, lumbar injury was at L1-L5 that cause paralysis or weakness of both legs ,bowel ,bladder and sexual dysfunction ,sacral injury cause loss of loss of bowel and bladder dysfunction and can cause weakness of the hip of the legs **(Urden & Stacy, 2016).**

Spinal cord injury results from falls , diseases such as polio or spinal bifida (a disorder involving incomplete development of the brain, spinal cord, and their productive covering), motor vehicle accidents and assaults among other causes, if the spine is weak because another condition ,such as arthritis apparently minor injuries can cause spinal cord trauma **(Alderson & Ravichandran, 2016).**

The extent of spinal cord injury determined through neurological examination, CT scan or MRI of the spine or spine x rays. Spinal cord injury may result some sign and symptoms such as loss of movement, loss or altered

sensation including the ability to heat and cold, loss of bladder control, exaggerated reflex activities or spasm, changes in sexual function, pain and difficult breathing, coughing or clearing secretion from your lungs **(Catalano, 2019).**

Immediate treatment to avoid long term effects, in some cases, surgery might be recommended to stabilize the bones of the spine, but surgery does not necessary reduce or repair nervous system injury. Bed rest might be needed in order for the spine to heal after acute spinal cord injury occurs, physical therapy, occupational therapy and other rehabilitation intervention sometimes required currently, there is no cure for spinal cord injury, however researches continue to work on advanced, which have resulting in decrease in damage at the time of injury **(Urden & Stacy, 2016).**

Accurate assessment and documentation of the spinal injury that includes motor and sensory function is important to provide baseline for ongoing care and this guideline sets out the vital assessments and data collection parameters. The devastating effects of SCI are well known to the public, which providing accurate the information to patients, their relatives of particular important information about the process of care should be provided early but in accurate prediction either pessimistic or optimistic can be devasting **(John, 2020).**

Aim of the study:

This study aims to assess the nurses" knowledge and practice regarding care for patients with spinal cord injury in the critical in care unit through:

1. Assessment of nurses' level of knowledge regarding caring for patients with spinal cord injury in the critical care unit.
2. Assessment of nurses' level of practice regarding caring for patients with spinal cord injury in the critical care unit.

Research question:

This study is based' on answering the following questions:

1. What is nurses' level of knowledge regarding caring for patients with spinal cord injury in critical care unit.
2. What is nurses' level of practice regarding caring for patients with spinal cord injury in the critical care unit.
3. Is the relation between Nurses' level of Knowledge and level of practice regarding caring for patients with spinal cord injury in the critical care unit.

Subjects and Methods:

Research design:

- The study will be a descriptive exploratory design.

The study will be portrayed under the four main design as following:

I. Technical design
II. Operational design
III. Administrative design
IV. Statistical design

I. Technical Design:

Technical design include setting, subjects and tools of data collection used in this study.

A-Setting:

The study was conducted at general intensive care unit and Neurological intensive care unit in Ain Shams University Hospital. The data were collected from two areas to achieve the numbers of nurses needed for the study.

B-Subjects:

A purposive sample of 50 nurses who cared for patients with spinal cord injury in critical care unit was included in this study. Nurses were included in this study.

Tools of the data collection:

Data were collected through using the following tools:

1-Nurses` self-administered questionnaire

2-Nurses` observational check list

Appendix I. Nurses' self-administered questionnaire.

It was used to assess nurses' level of knowledge regarding caring for patients with spinal cord injury. It was written an Arabic language to suit all the educational levels of the studied nurses: it was filled by the studied nurses themselves .this tool was developed by the researcher based on review of relevant recent literature and it included two parts:

A. Demographic characteristics of the nurses under this study:

It concerned with demographic characteristics of the nurses involved in the study as age, level of education, gender, marital status, years of experience, training courses, and working unit.

B. Nurses knowledge assessment sheet

It was used to assess nurses' level of knowledge regarding definition, , types, signs and, symptoms, component of neurological assessment, nursing care measures of the spinal cord injury. It was developed by the investigator in an Arabic language based on reviewing of scientific literature. The questionnaire consist of 39 questions in the form of multiple choice questions (MCQ) it divided 7 parts:

1- Definition of spinal cord injury(1 items)
2- Anatomy and Physiology of spinal cord injury (11 items)
3- Risk factors of spinal cord injury (1 item)
4- Causes of spinal cord injury (1 items)
5- Sign and symptoms of spinal cord injury (1 item)
6- Complication of spinal cord injury (3 items)
7- Care of spinal cord injury (15 items)

❖ **Scoring system:**

The total score for questionnaire was 39 marks, one mark for correct answer & zero mark for incorrect answer. The results of scoring system were classified as follows:

• Satisfactory knowledge level :Equal to or more than 70%
• Unsatisfactory knowledge level : less than70%

Appendix II Nurse's Observational checklist about nursing practice for patients with spinal cord injury:

It was developed by the investigator after reviewing the relevant and most recent literature to assess the actual nurses" practice in caring for patients with spinal cord injury. This tool written in an English language composed of 19 items and divided in to three main covering the following:

1-Neurological assessment (3 items)
2-General assessment (2items)
3-Head to toe assessment (6 items)
4- Nursing intervention (8 items)

❖ **The Scoring system classified as follows:**

The statement or step done was given score of 1 grade and statement or step not done was given score zero grade

Total score for the check list was 19 grades were classified as follows:

• Satisfactory practical level: Equal to or more than 70%
• Unsatisfactory practical level; less than 70%

Ethical consideration:

The ethical research considerations in this study will included the -following:

• The research approval was obtained from scientific research ethical committee in the faculty of nursing at Ain Shams University before starting study.

- The investigator clarified the aim of study to the nurses included in the study.
- The researcher assured maintaining anonymity and confidentially of the subject" data
- Nurse were informed that they were allowed to choose to participate or withdrawal.

II- Operational Design:

The operational design will include: preparatory phase, validity, reliability, pilot study and field work.

1. Preparatory phase:

- It included reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodical and magazines to develop tools of data collection.

2. Tool validity and reliability:

A. Content validity: After constriction of data collection tools, face and content validity of the study tools were assessed by a jury group consist of 9 experts in medical surgical department, Ain Shams University. The tools were distributed to the to judge its comprehensiveness, clarity and accuracy. The tools were rephrased based on the jury opinions. Based on their recommendations, additions, correction and modification of some items were done.

B. Tool reliability: Internal consistency reliability was assessed in the present study tools via Crobach 's Alpha reliability analysis to indicate how well the items in an instrument fit together conceptually, (alpha Cronbach's test scores were 0.88 and 0.92 for the

questionnaire about nurses 'performance and the observational checklist respectively.

3. Pilot study:

Pilot study was carried out on 10% of the nurses under study tools test the applicability, clarity and efficacy of the tools, then the tool modified according to the result of pilot study.

4.Field work:

Field work included the following; nurses who agreed to participate in the study were informed by the researcher about the nature and purpose of the study .Data were collected in three month from beginning November 2017 to January 2018 .The researcher visited the two intensive care units during actual work at the long dayshift from 8 am to 8 pm or the night shift from 8 pm to 8 am two days weekly. Each nurse was observed separately three times (for each phase) during caring patient with spinal cord injury by using spinal cord injury check list and it took 30-40 minutes the mean of three observations was calculated and recorded by the researcher.

III- Administrative Design:

An official permission was obtained from the nursing and medical director of intensive care unit at Ain Shams University hospital, after explaining the aim of the study to gain their approval.

IV- Statistical Design:

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc.,

Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

▪ Chi-square (x^2) test of significance was used in order to compare proportions between two qualitative parameters.

▪ Spearman's rank correlation coefficient (sr) was used to assess the degree of association between two sets of variables if one or both of them was skewed.

Result:

 Table (1): This table shows that the mean age of the studied nurses' was(20-30) years 66% (24.48+4.50) ,86% of the studied nurses were female, 66% of the studied nurses were married , according to educational level 40% of the study subjects were technician institute degree, regarding Experience years , 46% of the study subjects had 1-< 5 years experience and 64% of them had no training courses .

 Table (2): This table shows that76% of the studied nurses had satisfactory level of knowledge about anatomy and physiology of the spinal cord,94% of the studied nurses had satisfactory level of knowledge regarding definition of spinal cord injury ,88% of the studied nurse had satisfactory level of knowledge regarding causes of spinal cord injury,44% of the studied nurses had satisfactory level of knowledge regarding risk factor of spinal cord injury ,84% of the studied nurses had satisfactory level of knowledge regarding symptoms of

▪ The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:

▪ Probability (P-value) Degree of significance of results were considered as follow:
– P-value <0.05 was considered significant.
– P-value <0.001 was considered as highly significant.
– P-value >0.05 was considered insignificant.

spinal cord injury ,72% of the studied nurses had satisfactory level of knowledge regarding complication of spinal cord injury,44% of the studied nurses had satisfactory level of knowledge regarding nursing management of spinal cord injury.

 Figure (1): This figure shows the percentage distribution of knowledge among nurses included in this study. As regards to the satisfactory (54%) and unsatisfactory (46%) of total knowledge of nurses about nursing care to spinal cord injury patients.
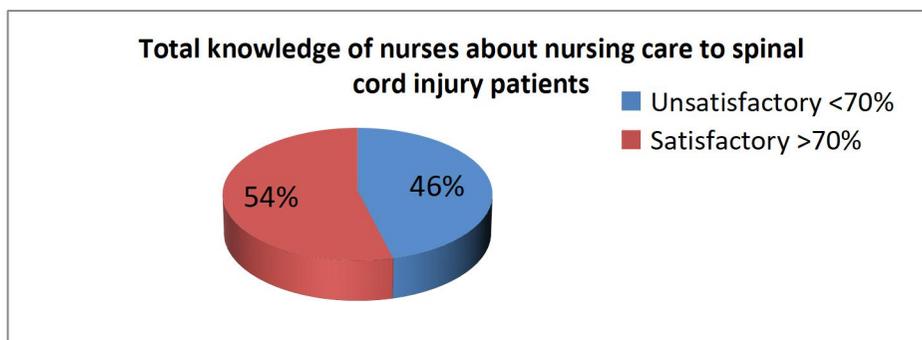
 Figure (2): This figure shows the percentage distribution of total practices among the studied nurses included in this study. As regards to the not done (58%) and done (42%) of total practice.

 Table (3): This table shows the relation between nurses' total knowledge and total practice (x^2= 14.661, with p-value <0.001**), which there is a highly satisfactory significant relation nurses' total knowledge and practice.
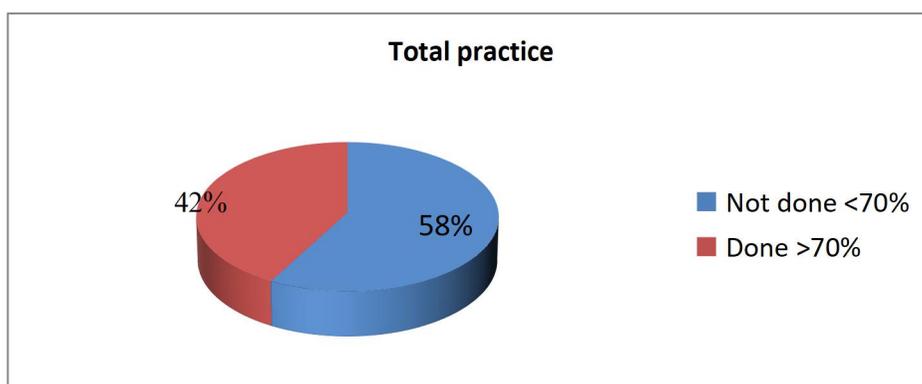
 Table (1): Percentage distribution of the studied nurses' according to their socio-demographic characteristics(n=50).

Items	Frequency	Percent
Age (years)		
<20 years	7	14%
20- <30 years	33	66%
30- <40 years	7	14%
≥40 years	3	6%
Mean ±SD	26.48±4.50	
Gender		
Male	7	14%
Female	43	86%
Marital Status		
Single	17	34%
Married	33	66%
Level of education		
Diploma	3	6%
Technician Institute	20	40%
Bachelor	19	38%
Postgraduate (Higher degree)	8	16%
Experience (years)		
<1 year	8	16%
1- <5 years	23	46%
5- <10 years	9	18%
≥10 years	10	20%
Mean ±SD	5.72±1.97	
Workplace		
General intensive care	26	52%
Brain and nerve care	24	48%
Training courses		
Yes	18	36%
No	32	64%

Table (2): Percentage distribution of studied nurses according to their level of knowledge regarding caring of patients with spinal cord injury(N=50).

Items of knowledge	Satisfactory		Unsatisfactory	
	No.	%	No.	%
Anatomy $ physiology of spinal cord	38	76%	12	24%
Definition of spinal cord injury	47	88%	3	6%
Causes of spinal cord injury	44	88%	6	12%
Risk factors of spinal cord injury	22	44%	28	56%
Sign and symptoms of spinal cord injury	42	84%	8	16%
Complication of spinal cord injury	36	72%	14	28%
Nursing intervention of spinal cord injury	22	44%	28	56%
Total score of knowledge	36	72%	14	28%

Figure (1): Percentage distribution of nursing according to their total knowledge

Figure (2): Percentage distribution of studied nurse regarding to their total practice.

Table (3): Relation between nurses total knowledge and total practice (n=50).

Total Practice	Total Knowledge (n-50)				Chi-square test	
	Unsatisfactory (N=23)		Satisfactory (N=27)		x2	p-value
	No.	%	No.	%		
Not done (N=29)	20	40.0	9	18.0	14.661	<0.001**
Done (N=21)	3	6.0	18	36.0		

Discussion:

Spinal cord injury(SCI) is an injury to spinal cord that can potentially affect every system of the body .It can be a catastrophic injury that changes a patient life completely. This injury affects the total physiological, psychological, economic and social wellbeing of the individual which might be disastrous **(Vernon & Kirshblum, 2018).**

Spinal cord injury is a life – threatening emergency that results in a high morbidity and mortality and therefore patients with spinal cord injury are considered critically ill patients and require urgent admission to hospital for urgent diagnosis and management. This

study aimed to assess nursing knowledge and practice of care provided to the patients with spinal cord injury to obtain better outcome and prognosis **(Pamela, 2015).**

The current study was carried out aiming to assess nurses'

Knowledge and practice regarding care of patients with spinal cord injury. Discussion of the findings of this study will cover the main parts of the results. The searchers used studies of different scope due to lack of researches that concerned with spinal cord injury and the researcher compare the data that related to concept of nursing performance (knowledge and practice).

Discussing the findings of the current study is categorized in to four main parts. The first part concerned with the demographic characteristics of nurses' included in the study, the second part displays the findings that related to studied nurses ' level of knowledge regarding care of patients with spinal cord injury, the third part discusses nurses' practices regarding care of patients with spinal cord injury, The fourth part displays the relation between demographic characteristics of the study subjects and the level of knowledge and practice regarding caring of patients with spinal cord injury.

Regarding the demographic characteristics of the nurses under the present study, the results revealed that he majority of the studied nurses' age were between 20 to 30 years. This explains that most of those nurses were newly graduated, young and tolerate the nature of the work in the critical care unit. This is in consistent with **Ignatavicius &**

Workman (2013) who found that more than three quarters of the study subjects ' age were between 20-30 years and the study is consistent with **Moorheads, Stocchetti & Bullock, (2013)** who revealed that about half of the studied subjects were less than 30 years old . This finding is contra diction with **Luna (2015)** who found that the majority of the study nurses were 30 to 40 years old.

As regard years of experience in critical care unit , the current study showed that less than half the studied nurses had less experience because the nurses under the study were recently graduated and also due to ,work stress and severity of the patient's condition and occupational hazards that facing them in ICU. All of this prevent them continuing work as critical care nurse. This finding agree with **Mohammed (2016)**who reported that more than half of the study subjects years of experience in ICU ranged between (1-5) years and. **This results inconsistent with Wami (2014)** who stated that the largest number had experience more than one year to five years in ICU.

As regard having previous training courses, the present results showed that, the majority of the nurses under study had no previous courses, this may be due to shortage of staff, work load , lack of time in intensive care unit (ICU).This results is similar to **Shabin (2014)** who reported that majority of the studied subjects had no previous courses.

As regards to nurses' knowledge regarding care for patients with spinal cord injury ,regarding the total level of knowledge ,the present result showed that about more than half of the nurses' under study had satisfactory level

of knowledge regarding care of patients 'with spinal cord injury . This result may be due to that the majority of nurses under study were recently graduated. This is in consistent with **Bari & Garcia & Tsao(2012)** who reported that three quarters of the study subjects had adequate knowledge regarding care patients' with spinal cord injury.

According to nurses' knowledge about anatomy and physiology of spinal cord, the current study revealed that more than two thirds of the studied nurses had satisfactory knowledge about anatomy and physiology of spinal cord. This was congruent with **Mohar, Weiss & Cavenes (2016)** whose research revealed that more than three quarters of the study sample had satisfactory knowledge about anatomy and physiology of spinal cord'

The current study revealed that ,most of nurses under study had satisfactory knowledge about definition of spinal cord injury ,causes, sign and symptoms and complication of spinal cord injury, this might be due to the studied subjects experience, these finding agreed with **Maas, Menon & Steyerberg (2015)** who research revealed that more than two third of nurses were aware of definition ,causes ,sign and symptoms and complication of spinal cord injury.

As regard spinal cord injury, the result of the present study showed that, more than two thirds of study nurses had unsatisfactory knowledge as regard nursing intervention of spinal cord injury, this might be due to .As well **Yue, Vassar & Lingsma, (2017)** who stated that more than half of the study subjects had inadequate knowledge about nursing intervention of spinal cord injury.

Regarding for the total nurses's practice, The present study showed that more than half of the studied nurses had incompetent level of practice regarding care of patients with spinal cord injury . this could be attributed to many reason as more than one third of the nurse under study were technical institute of nursing and not have special degree in ICU nursing , they were newly graduated ,as well they had inadequate experience in critical care unit (more than one third of the studied nurses had experience less than five years),lack of in –service training program prior to the work in critical care unit, this is agree with **Wami (2014),**68/9 who stated that the majority of nurses working in the adult in intensive care units had inadequate practice regarding care patients with spinal cord injury.

Concerning the nurses' practice regarding assessment of neurological status through gowcoma scale, finding revealed that nurses practice regarding assessment of eye opening, most of the study subjects had satisfactory practice regarding assess eye opening to speech , assess eye opening to painful stimulation. The result of the current study were contra indicated with **Gentry, Wallace, Kvarfordi & Lynch,(2016)** whose result showed that the majority of nurses in the study had unsatisfactory practice regarding assess eye opening to speech and painful stimuli

The current study regarding assessing verbal response, revealed that the majority of nurses had satisfactory practice regarding assess orientation to time, place and person., assess appropriate wards &assess comprehensive sound, this study was consistent with **Young, Champron &**

Holcomb, (2017) whose results showed that the most of nurses in the research had satisfactory practice regarding assess orientation to time , place and person ,assess appropriate wards& assess comprehensive|

As regards to study the relation between participants total 'knowledge and practice .the current study revealed that there was a statistical significant relation between the nurses' knowledge and practice. More than half of nurses had satisfactory level of knowledge, had satisfactory level of practice. Agreement with other study **Majeski, Lynch & Drust (2009)** which showed that there was a statistical significant relation between nurses' knowledge and their practice.

As regards to relations between level of practice and demographic characteristics. The current study revealed that there was statistically significant relation between the nurses' level of practice regarding caring of patients with spinal cord injury and their demographic characteristics level of education and year of experience and there was no significant relation with age this findings consistent with **Said (2012)** who stated that significant relation in practice was found between ICU nurses with different educational level.

Also, the current study revealed that there was a highly statistically significant relation between the nurses' level of practice regarding care of patients with spinal cord injury and their years of experience in critical care unit. This is supported by **Wami (2014)** who stated that there was a significant relation in practice was found between ICU nurses with different year of experiences.

This finding is contradicted with **Feru (2016)** who stated that there was no significant relation in practice between participants with different year of ICU working experience and the nurses demographic characteristics, there was no significantly affect the practice of nurses. This implied that the performance level is influenced by other factors needed more dialysis.

This study showed that there was no significant relation between nurses' level of practice and their age , Approximately more than half of the nurses under study there age from 20-29 years old and had no satisfactory level of practice ,this was might be due to their recently study and no perfectly practice ,and more. This finding is agreed with **Feru (2016)** who stated that there was no significant relation in practice with age of participant.

Conclusion:

Based on the findings of the study, the researcher concluded that more than half of the studied nurse had satisfactory knowledge regarding care of patients with spinal cord injury and about more than half of them had an unsatisfactory level of practice regarding caring for patients with spinal cord injury.

In addition there was a statically significant relation between the total nurses' knowledge and their level of education, years of experience and their training course and also there was statically significant relation between the total nurses ' practice level and the year of experience , the level of education and their training courses . As regards the relation between the total nurses knowledge and their total practice level

there was a statistical significant relation and correlation between the total nurses ' knowledge and their total practice level regarding caring for patients with spinal cord injury in critical care unit.

Recommendation:

The results of this study projected the following recommendation:

1- Continuous evaluation of nurses' knowledge and practice is essential to identify their needs in ICU about caring patient with spinal cord injury.

2- Designing nurses' educational program to improve nurses knowledge about anatomy of the spinal cord and physiology of spinal cord injury and caring of spinal cord injury.

3- Procedure technique book regarding caring for patient with spinal cord injury is available in ICU as a reference for all nurses.

4- An orientation program should be prepared to help the newly appointment nurse's to revise, acquire and develop the knowledge and practice regarding assessment and caring patient for spinal cord injury in ICU.

5- Replication of the study on larger subjects selected from different geographical areas of Egypt is recommended.

6- Further research is recommended to evaluate the effect of training program

on nurse's performance regarding caring patient with spinal cord injury.

References:

Alderson J. D & Ravichandran G (2016). Anathethetic and associated care of spinal cord injury P.p(1-20)

Baird, M.S, (2016). Manual of critical care nursing (nursing intervention and collaborative management), 7thed, Elsevier ,Inc, united states of America ,Pp (901-911)

Burns, S.M, (2014). AACN Essential of critical care nursing, Third edition , in china Pp (149-217)

Ignatavicius , D.& Workman, L, (2013). Medical surgical nursing (patient-centered collabortive care, 8thed ,Elsevier ,Inc,canda,Pp (1720)

John, M.F & Keith, F.P. (2013). Practical urology in spinal cord injury P-P(350-362)

Moorheads A, Johnsons S, Maas D, Swansons N , (2013). Nursing outcomes classifications,8thed, Mosby an imprint of Elsevier . Inc, United states of America Pp(16-18)

Pamela, L.S. (2015). All-in-one care planning resourses P.P (396-405).

Perrecene, M.R & Shannen, C.E, (2014). Text book of medical surgical nursing, 13edition, china Pp (651-665).

Rundqwst, J, & Gassaway, J & Bailey, J (2011) The SCI rehab project: treatment time spant in SCI Rehabilitation. Nursing desides

education and care management time during in patient with spinal cord injury rehabilitation, Journal of Spinal cord Medicine (205-215).

Shabin, M.L, Kelin, D.G & Mosely, M.J (2015). Introduction to critical care nursing ,6th edition in china Pp(389-398).

Urden, L.D & Stacy, K.M (2016), critical care nursing, seven edition in Canada Pp (331-346).

Vernon, W.L & Kirshblum. S (2018): Spinal cord medicine P.P(75-85)

Chhabra. H.S (2015): ISCOS text book on comprehensive management of spinal cord injury, Wolters Kluwer in dia Pp(1110-1150)

Catalano. J.T (2019): Nursing now: today`s issues, Tomorrows rant, F.A davis Pp (620-654)

John. L.L (2020): Spinal cord injury, An issue of physical medicine and rehabilitation, Elsevier .H .c, united of North America Pp(195-200).