

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

¹Shimaa N. Abdelsalam , ²Dalia A. Abdelatief, ³Rasha M. Elmetwalley, ⁴Maha A. Nada

Medical – Surgical Department, Faculty of Nursing, ⁴ Neurology Department, Faculty of Medicine, Ain Shams University

Abstract

Aim: This study aimed to evaluate the effect of improving nurses` awareness and self – efficacy to control extremities muscles contracture in critically head injured patients. **Subjects and Method :** A quasi-experimental design was utilized for the conduction of this study in the Surgical Hospital affiliated to Ain Shams University in the following Critical Care Units (Neuro- Surgery , ICU and Emergency). **Sample:** A purposive sample was composed of 50 nurses with different ages, education and experiences. In addition, 40 critically head injured patients from the above mentioned settings. **Tools of data collection :** 1) Self administered questionnaire (pre / post tests) to assess the studied nurses` knowledge as regards controlling extremities muscles contracture . 2) An observation checklist (pre / post tests) to evaluate studied nurses ' practices in relation to care of patient's withcritically head injury to control extremitiesmuscle contracture. 3) General self-efficacy scale (pre / post tests) to assess studied nurses` self – efficacy level. 4) Patients` condition assessment sheet (pre / posttests): a) Glasgow Coma Scale to assess level of consciousness . b) Muscle contracture assessment sheet. **Results:** Mean ages of studied nurses were (16.7± 9.6). More than half of them had diploma nursing with less than five years of experience. In addition, there were unsatisfactory level of nurses` knowledge, practices and self – efficacy in pre test . As regards the studied patients , significant improvement was indicated in post and follow- up tests for muscle contracture . **Conclusion :** In light of the present study, improving nurses` awareness (knowledge and practices) and self – efficacy through educational guidelines was helpful on controlling extremities muscles contracture in critically head injured patients , whereas significant improvement was indicated in post tests compared to pre. Moreover, patients` health condition assessment (incidence of extremities muscles contracture) was reduced in post - tests. **Recommendations:** Further studies should be carried out on a large number of critical care nurses with evidence of results and generalization.

Key words: Critically head injured patients - Control extremities muscles contracture - Improving nurses` awareness and self – efficacy .

Introduction

Head injury is a worldwide public health problem and one of the most leading causes of death and disability. The incidence of contracture deformity is

common in moderate to severe acquired brain injury .The lack of early intervention to maintain muscle length in the muscles will progress to a fixed deformity. Immobility leads to decreased

Critically Head Injured Patients: Improving Nurses' Awareness and Self – Efficacy to Control Extremities Muscles Contracture

muscle protein synthesis, increased muscle catabolism and decreased muscle mass especially in the lower extremities. These changes are manifested as reduced cross-sectional muscle area and decreased contractile strength. Muscle atrophy begins within hours of immobility resulting in a 4–5% loss of muscle strength for each week of bed rest. Critically ill patients lost 18% of their baseline body weight by discharge (Stephanie & Herbart, 2017 & Khan et al., 2014).

Muscle contractures are defined as a shortening of muscle or connective tissue around the joints that prevent the normal range of movement of joints. The tightening of these muscles and tissues are due to immobility and cause deformities of joints to become bent in affixed position. Muscle contractures may begin in as little as four days and range of motion is lost by day 14 or 15. Muscle weakness is a typically primary motor impairment of acquired brain injury due to the altered neural input secondary to brain damage which compromises neuronal recruitment and volitional muscle activation. In addition, short-term immobility impairs microvascular function and induces insulin resistance which may contribute to neuromuscular injury in the critically ill. Moreover, increases production of pro-inflammatory cytokines and reactive oxygen species resulting in further muscle proteolysis with a net loss of muscle protein (Eve et al., 2016 & Prabhu et al., 2013).

Types of muscle contracture include Dupuytren's (palmar fascia): Flexion deformity of the fingers or toes due to shortening, thickening and fibrosis of palmar or plantar fascia. **Ischemic:** Muscular contracture and degeneration due to interference with the circulation from pressure or cold. **Volkman's:** contracture of fingers and sometimes of

the wrist, or of analogous part of the foot, with loss of power. **Fibrotic:** contracture of muscle in which the muscle tissue has been replaced by fibrous tissue of injury. **Functional:** contracture of muscle that decreases during anesthesia or sleep. **Myostatic:** an adaptive shortening of muscle, usually caused by immobilization and without tissue pathology. **Physiological:** temporary condition in which tension and shortening of muscle occur for a considerable time. **Pseudomyostatic:** permanent contraction of the muscle due to the central nervous system lesion, resulting in loss of range of motion and resistance of the muscle to stretch (Harvey et al., 2017 & Kay-Leigh et al., 2015).

Complications of contractures which happen in the joints such as elbows, shoulders, knees and hips are: Limit patient ability to move because of muscles and tendons can be shortened making the joint stiff and painful. Capillary occlusion at bony prominences and contributing to pressure ulcers. As much as 50% to 70% of all pressure ulcers are related to untreated contractures. Fixed deformity if not treated properly. Ankle contracture is a common complication that range from abnormal posturing of the foot and ankle with plantar flexor and/or invert or muscle over activity during movement to be fixed joint contracture (John et al. 2015 & Leung, 2014)

Critical care nurses have an important role in prevention of muscle contracture by applying passive range of motion exercises, adequate joint support to reduce constant shortening or stretching of muscles and surrounding tissues. In addition, foot board to maintain functional strength and alignment of external ties, splints to maintain functional position of hands, arms, legs and feet through a frequent position change every 2 hours, using of

air mattress and sandbags, rolled up towel or a wedge pillow to maintain patient's neck (Dewit et al., 2016 & Nettina, 2014).

Self-efficacy is an assurance one feels about certain activities which affects the level of performance. It can show an individual's thinking and practice method therefore; professional qualification is in relation with self-efficacy (Soudagar et al., 2015 & AbouElala, 2012). People with higher self-efficacy are more successful when faced with challenges. This is especially true in the profession of nursing where they always have to deal with unforeseen situations which could be factors leading to stress. Promotion and protection of human health occur when health care professions have the highest rates of satisfaction (Dykes et al., 2011).

Significance of the study

In the United States approximately one million people receive treatment for head injuries every year. Most critically ill patients with traumatic brain injury (TBI) (75-80%) have mild head injuries and the remaining injuries are divided equally between moderate and severe categories (Segun & Stephen, 2017 and Eve et al., 2016). According to the official statistics in Intensive Care Unit at Ain Shams University Hospital about 200 cases admitted yearly.

Acquired brain injury is a major cause of disability worldwide. More than one-third incidence of developing a muscle contracture was documented for patients with a hospital stay longer than 2 weeks. Joint that has not been moved sufficiently can begin to stiffen within 24 hours and will eventually become inflexible (Harvey et al., 2017). The economic consequences of traumatic brain injury are enormous as patients are more likely to need assistance with mobility, self-care, daily activities and social participation. Improving the health

outcomes of patients with acquired brain injury would help optimize individuals' independence and also ease the economic burdens on society (Khan et al., 2014).

Critical care nurse has an important and crucial role in developing the best practice standards in an attempt to control extremities muscles contracture in critically head injured patients. Therefore, nurses' education and reinforcement is considered as the cornerstone and the first step.

Aim of the Study

This study aimed to evaluate the effect of improving nurses' awareness and self-efficacy to control extremities muscles contracture in critically head injured patients. This aim was achieved as follows:

- Assess studied nurses' knowledge, practices and self-efficacy level as regards controlling extremities muscles contracture in critically head injured patients.
- Develop and implement the educational guidelines for the studied nurses about extremities muscles contracture in critically head injured patients.
- Evaluate its effect on:
 - o Nurses' knowledge, practices and self-efficacy level.
 - o Incidence of extremities muscles contracture among studied patients post guidelines

Hypothesis:

It was hypothesized that, the educational guidelines had a positive effect on nurses' awareness and self-efficacy to control extremities muscles contracture in critically head injured patients.

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

2. Subjects and Method:

Operational definitions:

Awareness: means nurses` knowledge and practices

Improving : means educational guidelines

Educational guidelines: means theoretical and practical sessions .

Research design:

A quasi-experimental design was utilized to conduct this study

Setting:

This study was conducted in the Surgical Hospital affiliated to Ain Shams University in the following Critical Care Units (Neuro - Surgery, ICU and Emergency)

Subjects:

A purposive sample was composed of 50 nurses with different ages, education and experiences. In addition, 40 critically head injured patients were divided into two groups , each group = 20 patients . They were taken as follows:

- Neuro - Surgery (20 nurses , 15 patients)
- ICU (20 nurses , 15 patients)
- Emergency (10 nurses , 10 patients)

Inclusion criteria for :

Nurses

- Willing to participate in the study.

- Working in critical care units.

- Had experience not less than one year.

Patients

- Patients with critically head injury (moderate and severe levels)
- No musculo-skeletal problems.
- Newly admitted.

Tools of data collection

I- Self administered questionnaire (Pre/post / follow up tests). It was designed by the researchers in light of the relevant and related literatures and written in simple Arabic language. Data obtained were related to:

❖ **Demographic characteristics** of the studied nurses which included

(age, sex, qualifications, years of experience and previous training)

❖ **Nurses` knowledge assessment sheet about :**

▪ Extremities muscle contracture among critically head injured patients: Definition, causes, diagnostic measures, signs and symptoms management, complications pprevention, non-pharmacological management.

▪ Characteristics of extremities muscle contracture among critically head injured patientsinclude: Loss of skin elasticity, tightness of most tendon and muscles, limited mobility of joint , passive stretching increase pain, pallor appearance , pulse lessens sings , parathesia , paralysis , firmness of tissues on palpation ,

rigidity , flexion of hand fingers, and foot drop.

❖ Scoring system

Responses of the studied nurses were scored as (1) for correct answer and (zero) for incorrect answer. The total score was categorized into either satisfactory level (from 70% and more) or unsatisfactory level (less than 70%).

II - An observation checklist (Pre / post / follow up tests) :

- It was adopted from (*Lewis et al. , 2014 , Hinkle & Cheever , 2014 and Dewit et al. ,2016*) , developed and filled by the researchers to evaluate studied nurses ' practices regarding : Care of critically head injured patients to control extremities muscle contracture:Infection control measures , change patient's position frequently , measure coma level , maintain proper positioning and body alignment , use straps and support , splint for hand and foot , perform muscle contracture assessment technique , perform exercises` technique of muscle contracture , patients` routine care and ventilator care .

❖ Scoring system

A correct practice was scored as (1), while the incorrect (zero). It was scored into either inadequately done (less than 70%) or adequately done (70% and more).The total score was categorized as satisfactory = 70 – 100, or unsatisfactory = less than 70.

III - General self-efficacy scale (Pre / post / follow up tests).

It was developed by **Dykes et al.(2011)** to assess a general sense of perceived self-efficacy with the aim to predict coping with daily hassles as well as adaptation after experiencing all kinds of stressful life events among critically

head injured patients to control extremities muscle contracture .

❖ Scoring system

Responses are made on a 4-point scale. Sum up the responses to all 8 items to yield the final composite score with a range from 8 to 32 . Rating scale(1 = Not at all true , 2 = Hardly true , 3 = Moderately true and 4 = Exactly true) . Level of self-efficacy was considered high if the score 60% or more and low if it less than 60%.

IV-Patients` condition assessment sheet. It included:

❖ **Characteristics of the studied patients** as regards age , intubation (days) , mode of ventilation , diagnosis, duration of hospital stay, body mass index (BM) and current medical history .

❖ **Glasgow Coma Scale(Pre / post tests)** : It was developed by **Winkler et al. (1984)** to assess level of consciousness in traumatic brain injured patients .The GCS is divided into 3 items; eye opening (E), motor response (M), and verbal response (V). The score is determined by the sum of the score in each of the three categories, with a maximum score of 15 and a minimum score of 3, as follows:

Eye Opening (E)

Spontaneous = 4 , to voice = 3 , to pain = 2 and none = 1

Verbal Response (V)

Normal conversation = 5 , disoriented conversation = 4 , words =3, no words = 2 and none = 1 .

Motor Response (M)

Critically Head Injured Patients: Improving Nurses' Awareness and Self – Efficacy to Control Extremities Muscles Contracture

Normal = 6 - Localized to pain = 5 - Withdraws to pain = 4 - Decorticate posture = 3 (an abnormal posture that can include rigidity, clenched fists, legs held straight out, and arms bent inwards toward the body with the wrists and fingers bend and held on the chest) - Decerebrate = 2 (an abnormal posture that can include rigidity, arms and legs held straight out, toes pointed downwards, head and neck arched backwards) - None = 1 .

❖ Muscle contracture assessment sheet (Post / follow – up tests) :

It was developed by **Thomas (2008)** to detect the degree and incidence of muscle contracture. A springy or bouncy end feel at end range indicates a good elasticity while a hard end feel represents poor elasticity. Fixed contractures manifest as a rock-hard end feel. Non-fixed contractures generally allow for at least 10 degrees of passive range of motion .

Performing a passive stretch to a patient's comfortable end range. End feel can be documented as follows :

Fixed contracture = Rock-hard end feel, no play (this means that when the researcher tries to move patient's arm or leg it doesn't move in a different range of motion).

Poor = 1-3 degrees of play at end feel (means that patient's extremity moves with a small degree) .

Average = 4-6 degrees of play at end feel (means that patient's extremity moves with a little angle).

Good = 7-10 degrees of play at end feel (means that patient's extremity moves well but it doesn't give full angle of motion).

Excellent= Springy and bouncy end feel; 11+ degrees of play (means that patient's extremity moves in a different direction without any resistance) .

Content validity:

It was assured by a group of experts from Medical and Nursing staff . Their opinions were collected as regards to tools format layout, consistency and scoring system. Tools' contents were tested regarding to the knowledge accuracy, relevance and competence.

Ethical considerations

In the planning stage approval was obtained from directors of the above mentioned settings. All nurses were informed about the study and their rights according to medical research ethics that they were free to decide whether or not they would participate in the study. Then a written informed consent was obtained from each nurse who agreed to participate in the study.

Pilot study:

A pilot trial was carried out on 10% of the total study sample to test the clarity and practicability of the tools, in addition to subjects and settings. Pilot subjects were later included in the study as there were no radical modifications in the study tools

Procedure:

- Study purpose was simply explained to the nurses who agreed to participate in the study prior to any data collection .
- The current study was started and completed within 8 months.
 - Researchers started to collect data from the studied nurses in the critical care units of the above

mentioned setting (Neuro - Surgery , ICU and Emergency) using the pre constructed tools .

- Data were collected by the researchers 2 days/week, at morning / afternoon shift .
- The guidelines were designed based on analysis of the actual educational needs of studied nurses in the pre test .
- Guidelines` content was written in simple Arabic language and consistent with the related literature and met nurses` level of understanding.
- Educational guidelines were presented in theoretical and practical sessions. Nurses were divided into small groups including 4 – 5 and repeated sessions included all nurses , each group obtained 4 sessions (2 theory and 2 practice). Moreover , each nurse was guided by simple written instructions and then orientation about objectives and outline .

Theoretical part was implemented through lectures and group discussions, using data show and poster as a media . It was taken in 4 hours for 2 sessions (one session weakly for 2 hours) and cover the following items about extremities muscle contracture among critically head injured patients: Definition , causes , diagnostic measures , signs and symptoms management , complications pprevention and non-pharmacological management .

Practical part was implemented through demonstration, re-demonstration and video. It was taken in 9 hours for 3 sessions (one session weakly for 3 hours) and

covers the following items . First and second sessions about care of patients with Infection control measures , change patient's position frequently , comfort techniques , measure coma level . Third session about assessment and perform exercises technique of muscle contracture and patients` routine care .

The nurses applied physical exercises to all patients in the study through three sessions daily .The time taken for the three sessions is 30-45 min for each patient daily in Intensive Care Unit and stay for one month then evaluated .

Session I:

- Patient lying down on prone position . to helps in stretching the knees and hips
- Splints were applied for 5 hours and were removed it for one hour and this trail was repeated along the day. Maintain proper positioning and body alignment. Use straps and support. Splint was applied for hand and foot.

Session II:

- Stretching joints on a daily basis by applying a range of motion exercises makes sure that all the muscles and tendons get maximal stretch .

Upper extremities :

- Elbow flexion and extension
- Shoulder flexion , extension, internal and external rotation, abduction,
- Neck rotation and flexion - Finger and wrist flexion and extension
- Thumb flexion and extension.

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

- Keep patient's wrist and elbow straight with thumb up (pointing towards head) arm is moved from side up towards ear . Continue stretching slowly until feel some resistance at shoulder.

- For forearm : internal and external rotation .

- For shoulder , move the arm along the bed to the shoulder level. Bend the elbow to 90 degrees, internal and external rotation .

Lower extremities:

- Hip and knee flexion, hip rotation and abduction - Ankle rotation - Toe flexion and extension - Heel cord stretching - Lumber rotation

Hip bending movement:

- Nurse faces patient and bends the hip and knee up towards the person's chest. Nurse holds it there and then slowly brings the leg down. Repeat several times.

Hip turning movement:

- Place hands just above and below the patient's knee. Roll knee in and hold the patient's leg for 60 seconds then the nurse rolls knee out and holds and repeat several times.

- Keep the leg straight, slowly raise patient's leg until it stretches. Be sure to keep the other leg flat during the stretch.

- Support the leg at the knee and heel, and bring the knee towards the chest. Return the leg to the bed. Repeat this several times.

Session III :

-Hamstring stretch:

- Place hands above and below the patient's knee and raise the leg with the knee straight .Then rest the lower part of the leg on the nurse's forearm or shoulder. Repeat that several times.

Bending foot down movement:

- The nurse holds under patient's heel and on the top of the foot above the toes, bends the foot down then hold it. Repeat that several times. Moving foot in and out.

- Stabilize lower leg above the ankle. The nurse's other hand holds the patient's foot and moves it in and out. Hold at the end of each movement. Repeat that several times.

Toe bending movement:

- Place hands on top of patient's foot and toes , with the other hand, the nurse holds foot stable , then bends toes down and holds , bend the toes up and holds. Repeat that several times .

▪ Nurses were informed to be in contact with the researchers by telephone for any guidance.

▪ Nurses were assessed in groups that entail 4-5 according to their readiness .

▪ Evaluation of the guidelines` effect on studied nurses and patients as regards :

- Nurses` knowledge , practices and self – efficacy level by using pre test (pre guidelines sessions) , post – test (immediately after guidelines) and follow- up test (After 3 months later) by using the same tools.

- Patients` coma level and incidence of extremities muscle contracture were assessed one month post guidelines and one months later in follow up test using the same tool (Group 1 for post assessment and Group 2 for follow – up assessment).

Statistical Design:

The data collected were organized, sorted, tabulated and analyzed using Statistical Package for Social Sciences (SPSS) . They were presented in tables and charts using numbers, percentages, means, standard deviations and t – test.. Level of significance was threshold at 0.05 .

Results

Table (1) : Characteristics of the studied nurses (n= 50).

Items	Studied Nurses (n=50)	
	No	%
Age	27	60.0
20- < 35	15	30.0
35- < 45	8	10.0
45 and more		
Mean No ± SD	16.7± 9.6	
Gender		82.5
Female	38	17.5
Male	12	
Qualification		52.5
Diploma of nursing	24	32.5
Bachelor	16	15.0
Postgraduate	10	
Years of experience		67.5
1- < 5yrs	32	32.5
5yrs. & more	18	
Previous training	25	37.5

Table (1): Reveals studied nurses ’ characteristics. Results showed that mean age of nurses were (16.7± 9.6) . As regards their gender , majority (82.5) of them were female . Concerning qualifications, more than half (52.5) of them had diploma nursing. Regarding years of experience, nearly two thirds (67.5) of them were with less than five years of experience. In relation to previous training , more than one third (37.5) of them had previous training.

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

Table (2): Presentation of studied nurses` knowledge about extremities muscle contracture among critically head injured patients in pre/post tests.

Items	Studied nurses (n=50)		
	Pre	Post	Follow- up
Definition	31 (62.0)	40 (80.0)	46(92.0)
Causes			
Diagnostic measures	24 (48.0)	43 (86.0)	45 (90.0)
Signs and symptoms	30 (60.0)	41 (82.0)	44 (88.0)
Management	27 (54.0)	40 (80.0)	46 (92.0)
Complications	29 (58.0)	39 (78.0)	44 (88.0)
Prevention	20 (40.0)	41(82.0)	45 (90.0)
Non pharmacological management	22(44.0)	38 (76 .0)	43(86.0)
\bar{X} No \pm SD	26.1\pm4.2	40.3 \pm 1.6	44.7 \pm 1.1
T1 between pre & post tests	22.5*		
T2 between post & follow- up tests	16.9*		

Table (2): Clarifies studied nurses` satisfactory knowledge about extremities muscle contracture among critically head injured patients in pre/post tests . Results indicated significant improvement in nurses` knowledge for post and follow - up tests (mean = 40.3 \pm 1.6 & 44.7 \pm 1.1 respectively) compared to pre – test (26.1 \pm 4.2), with t1 – test (between pre & post) = 22.5 and t2 test (between post & follow-up) 16.9), $p < 0.05$.

Table (3): Presentation of studied nurses` knowledge about characteristics of extremities muscle contracture among critically head injured patients in pre/post tests

Items	Studied nurses (n=50)		
	Pre	Post	Follow- up
Loss of skin elasticity	30 (60.0)	40 (80.0)	46 (92.0)
Tightness of most of tendon and muscles	23 (46.0)	43 (86.0)	45 (90.0)
Limited mobility of joint	27 (54.0)	41 (82.0)	46 (92.0)
Passive stretching increase pain	31 (62.0)	42 (84.0)	47 (94.0)
Pallor appearance	30 (60.0)	39 (78.0)	43 (86.0)
Pulse lessness sings	21 (42.0)	41 (82.0)	45 (90.0)
Parasasia	22(44.0)	40 (80.0)	46 (92.0)
Paralysis	32 (64.0)	42 (84.0)	47 (94.0)
Firmness of tissues on palpation	24 (48.0)	43 (86.0)	45 (90.0)
Rigidity	27 (54.0)	40 (80.0)	46 (92.0)
Flexion of hand fingers.	23 (46.0)	39 (78.0)	43 (86.0)
Foot drop.	30 (60.0)	38 (76.0)	42 (84.0)
\bar{X} No \pm SD	26.7 \pm 3.9	40.7 \pm 1.6	45.1 \pm 1.6
T1 between pre & post tests	23.7*		
T2 between post & follow- up tests	14.2*		

Table (3): Shows studied nurses` satisfactory knowledge about characteristics of extremities muscle contracture among critically head injured patients in pre/post tests. Results indicated significant improvement in nurses` knowledge regarding post and follow - up tests (mean = 40.7 \pm 1.6 & 45.1 \pm 1.6 respectively) compared to pre – test (26.7 \pm 3.9), with t – test = 23.7 and 14.2 respectively), $p < 0.05$.

Table (4): Presentation of studied nurses' practices regarding care of critically head injured with extremities muscle contracture in pre/post tests.

Items	Studied nurses (n=50)		
	Pre	Post	Follow-up
Infection control measures	22(44.0)	38(76.0)	43 (86.0)
Change patient's position frequently	20(40.0)	40(80.0)	45 (90.0)
Maintain proper positioning and body alignment	29(58.0)	39 (78.0)	43 (86.0)
Use straps and support	23(46.0)	40(80.0)	46 (92.0)
Splint was applied for hand and foot	24 (48.0)	40(80.0)	47 (94.0)
Perform muscle contracture assessment technique	24(48.0)	38(76.0)	43 (86.0)
Perform exercises` technique of muscle contracture	27(54.0)	41 (82.0)	45 (90.0)
Patients` care	26(52.0)	39 (78.0)	46 (92.0)
Ventilator care	24 (48.0)	40(80.0)	47 (94.0)
\bar{X} No \pm SD	24.3 \pm 2.7	39.4 \pm 1.0	45.0 \pm 1.6
T1 between pre & post tests	36.8*		
T2 between post & follow-up tests	21.5*		

*Significant at $p < 0.05$

Table (4): Reveals nurses` satisfactory practices regarding care of critically head injured with extremities muscle contracture. Results showed significant improvement in patients` practices regarding post and follow - up tests (mean = 39.4 \pm 1.0 & 45.0 \pm 1.6 respectively) compared to pre – test (24.3 \pm 2.7), with $t - test = 36.8$ and 21.5 respectively), $p < 0.05$.

Table (5): Presentation of high self efficacy level among the studied nurses in pre/post tests

Items	Studied nurses(n=50)		
	Pre	Post	Follow-up
Receive verbal report about patients` condition	21(42.0.)	37(74.0)	45 (90.0)
Done as the previous shift	46.0)(23	72.0)(36	43 (86.0)
Increase information about the risk factors	34.0)(17	82.0.)(41	46 (92.0)
Increase information about the preventive measures	46.0)(23	80.0)(40	43 (86.0)
Assess muscle contracture risk among patients during the shift	50.0)(25	39 (78.0)	45 (90.0)
Give assistants` nurses face-to-face report about patients condition	38.0)(19	40(80.0)	46 (92.0)
Report nurses on the next shift what to do	23(46.0)	41 (82.0)	47 (94.0)
All nurses work together as a team	21(42.0.)	38(76.0)	43 (86.0)
Remain calm when facing difficulties	17(34.0)	39 (78.0)	45 (90.0)
Find several solutions when confronted with any problem	19 (38.0)	38(76.0)	46 (92.0)
Mean No \pm SD	20.8\pm2.7	38.9 \pm 1.7	44.9\pm1.4
T1 between pre & post test =	41.1*		
T2 between post & follow-up test =	19.3*		

* Significant at $p < 0.05$.

Table (5): Reveals high self efficacy level among the studied nurses in pre/post tests . Results showed significant improvement in post and follow - up tests (mean = 38.9 \pm 1.7 & 44.9 \pm 1.4 respectively) compared to pre – test (20.8 \pm 2.7), with $t - test = 41.1$ and 19.3 respectively), $p < 0.05$.

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

Table (6): Characteristics of the studied patients (n=40).

Items	Studied patients (n=40)	
	N	%
Age /Years		
▪ 20 - < 35	21	52.5
▪ 35 - < 50	13	32.5
▪ 50 & more	6	15.0
Mean No ± SD	13.3 ± 7.5	
Gender		
▪ Male	30	75.0
▪ Female	10	25.0
Body Mass Index		
▪ < 25 Normal	7	17.5
▪ 25 -< 30 Overweight	13	32.5
▪ ≥30 Obese	20	50.0
Intubation		
▪ Yes	38	95.0
▪ No	2	5.0
Mode of Ventilator		
▪ Control	25	62.5
▪ SIMV	15	37.5

Table (6): Shows characteristics of the studied patients. Regarding the age , more than two fifths (52 . 5) of them had the age of (20 - < 35 yrs) . Considering the gender , more than two thirds (75.0) of them were male . As regards body mass index , nearly one third (32.0) of them were with overweight . In relation to mode of ventilator, more than half of them were with (SIMV) Synchronized Intermittent Mandatory Ventilation.

Table (7): Presentation of the studied patients according to their level of coma in pre / post test

Coma level	Studied patients (n=40)			
	Post (n=20)		Follow-up (n=20)	
	Group 1		Group 2	
	1 st Week	4 th Week	1 st Week	4 th Week
▪ Un responsive	40.0	15.0	42.0	12.0
▪ Comatose	50.0	24.0	47.0	25.0
▪ Best response	10.0	61.0	11.0	63.0

* Significant at level P < 0.05

Table (7): Reveals studied patients coma level in post / follow – up tests. Significant improvement was indicated in fourth week compared to first week , whereas , three fifths of them were with best response in fourth week .

Table (8) :Incidence of extremities muscle contracture among the studied patients in post/ follow – up tests

Muscle Contracture level	Studied patients (n=40)			
	Post (n=20)		Follow – up (n=20)	
	Group 1		Group 2	
	No	%	No	%
▪ Poor	3	15.0	2	10.0
▪ Average	7	35.0	3	15.0
▪ Good	10	50.0	15	75.0

* Significant at level P < 0.05

Table (8): Shows incidence of extremities muscle contracture among the studied patients in post and follow – up . Results showed significant reduction in post test whereas , half of patients had good level , one third average level respectively and less than one fifth poor level .

Discussion

Muscle contracture refers to the physical shortening of muscle length and physical shortening of other soft tissues such as fascia, nerves, blood vessels and skin . It may be also accompanied by skin contracture that needs corrective plastic procedure **Stephanie & Herbart (2017) and Leung (2014)** . The current study aimed to evaluate the effect of improving nurses` awareness and self – efficacy to control extremities muscles contracture in critically head injured patients .

In the present study as regards nurses ` characteristics, mean age of studied nurses was **16.7± 9.6** .This finding was supported by **Soliman et al. (2014)** who reported that the mean age of the studied nurses was (32.32±6.70) with age ranged 20-40 years . In the same context , regarding the gender , female were represent a majority of the sample . This may be due to the greater fraction of the nurses in Egypt was female and may also related to the studying of nursing in Egyptian universities were exclusive for females only till few years ago Considering the educational level , more than half of

studied nurses had diploma nursing This result may be due to shortage of nurses' number that didn't let them have time to attend courses, unavailable supervision to follow it and shortage of nurse with high qualification ,lack of motivation to attend to training courses .**Gnataviuset al. (2016) & Bucher et al. (2014)** reported that the majority of the nurses in the study group were diploma holders .In relation to previous training , more than one third of them had previous training .

As regards studied nurses` satisfactory knowledge about extremities muscles contracture in critically head injured patients . Results showed significant improvement in post test compared to pre test . This result may be interpreted as education has a most important role in enhancing nurses` knowledge and patients` outcomes . Poor nurses' knowledge may be due to absence of awareness program . This findings were confirmed by **Soliman et al. (2014)** who stated that less than half of studied nurses had unsatisfactory knowledge about care of patients with extremities muscles contracture such as (definition , causes , diagnosis , signs and symptoms , management

Critically Head Injured Patients: Improving Nurses` Awareness and Self – Efficacy to Control Extremities Muscles Contracture

and complications) . In addition, **Dewit et al. (2016)** mentioned that critical care nurses should had knowledge about muscle contracture characteristics and risk factors .

Concerning studied nurses` satisfactory practices to control extremities muscles contracture in critically head injured patients . Results showed significant improvement in post test compared to pre test . This finding may be due to studied nurses were with less years of experience in critical area and majority of them had diploma nursing so need more training courses and audit from supervision . **Mohamed (2010)** found that less than half of nurses under study had adequate practices on : Infection control measures , positioning , measure coma level , perform muscle contracture assessment steps and exercises` technique of muscle contracture .

Regarding studied nurses ` self-efficacy level . Results showed significant difference in pre / post tests , whereas more improvement was observed in post test . **Dykes et al.(2011)** reported that other studies have found similar relationships between self-efficacy and awareness. In addition, poor nursing management was associated with lower self-efficacy level and knowledge . **Abou - Elala (2012)& Soudagar et al.(2015)** reported that there are different variable depending on nurses` age and self-efficacy level which indicate quality of patients` care .

Considering characteristics of the studied patients , results of the present study found that more than two fifths of them were aged from (20-30) years. It may be attributed to the fact that traumatic brain injury may affect this age group due to motor vehicle accidents. This result is in agreement with **Harvey et al. (2017) & Kay - Leigh et al.**

(2015) who reported that traumatic brain injury patient's had age ranged from 20-35 years. Concerning gender, more than two thirds of them were males. This result was supported by **Segun & Stephen(2017)and Nettina**

(2014) who stated that most of the traumatic brain injury patients were males.

As regards intubation , results revealed that majority of patients were intubated and were on control mood. This result was supported by **Johnetal (2015)**who stated that all traumatic brain injury patients in ICU needed mechanical ventilation on the control mood .Concerning the Glasgow Coma **Scale**, results revealed that more than two thirds of studied patients have lower GCS scores . This finding was supported by **Khanetal. (2014) &Prabhuetal. (2013)** who concluded that the GCS of head trauma patients in the first few days is less than 8 .

In relation to muscle contracture level , results showed that half of studied patients have a good muscle tone level and absence of contracture after the four weeks of the program of physiotherapy . This may be due to the effect of ideal nursing intervention for muscle contracture. **Joan et al. (2013)** demonstrated that contentious ROM and passive stretch have a good role in reducing muscle contracture . **Leung et al (2013) &Smeltzer et al. (2013)** reported that passive early physical activity and changing position every 2 hours have a good effect on prevention of stiffness and muscle contracture related to critical illness. Moreover, severe and chronic contractures are reduced following an intensive program of passive stretch provided in conjunction with a motor training program(**Meltzer et al., 2015**).

Conclusion

In the light of the present study, it can be concluded that, improving nurses` awareness (knowledge and practices) and self – efficacy through educational guidelines was helpful on controlling extremities muscles contracture in critically head injured patients , whereas significant improvement was indicated in post test compared to pre . Moreover, patients` health condition assessment (incidence of extremities muscles contracture) was reduced in post - test

Recommendations

Based on results of the current study, the following recommendations can be deduced:

- Assessment of muscle tone for critically ill patients should be included in routine nursing care and documented daily .
- The study reinforces the need for sustained education and training regarding extremities muscles contracture .
- An orientation program for the newly assigned nurses in the critical care units.
- Further studies should be carried out on a large number of critical care nurses with evidence of results and generalization .

References

1. **Abou Elala , R. (2012):**The Relationship Between Self-Efficacy and Job-Related Stressors as Perceived by Nursing Staff in the Critical Care Units. Unpublished master thesis. Faculty of Nursing, Alexandria University, Egypt.
2. **Bucher, L., Dirksen, S., Heitkemper, M. & Lewis, S. (2014):** Medical-Surgical Nursing Assessment and Management of Clinical Problems, 9th ed. , USA: Mosby, 316-60.
3. **Dewit, S., Stromberg, H. & Dallred, C. (2016):** Medical-surgical nursing: concepts and practice. Elsevier Health Sciences: 694-7.
4. **Dykes, P., Carroll, D., McColgan, K., Hurley, A., Lipsitz, S., Colombo, L., Zuyev L. & Middleton, B. (2011):** Scales for assessing self-efficacy of nurses and assistants for preventing falls. *j.adv.Nurs.*, Feb;6, 7(2):438-49.
5. **Eve , D, Steele , M. , San , P. & Borlongan , C. (2016):** Hyper Baric Oxygen Therapy As Optimal Treatment For Post Traumatic Muscular Disorder Following Traumatic Brain Injury, *Pub med J.*, 20(12):1-3.
6. **Gnataviius , D., Linda ,M. , Blair , M. , Rebar , C. & Winkelman C. (2016) :** Medical Surgical Nursing patient- Centered Collaborative Care, 8^{ed}, Elsevier CO., 487.

**Critically Head Injured Patients: Improving Nurses` Awareness and
Self – Efficacy to Control Extremities Muscles Contracture**

7. **Harvey , L., Katalinic , M., Herbert , A. &Schurr ,L. (2017):** Stretch for the Treatment and Prevention of Contracture, *Physiotherapy J*, 63(2): 67-75.
8. **Hinkle , J. & Cheever, K.(2014):** Textbook of Medical-Surgical Nursing, 13th ed. , Philadelphia: wolters kluwer health, 1389-400.
9. **Joan , L. , Lisa , A. & Anne , M. (2013):** Intensive Programme Of Passive Stretch and Motor Training To Knee Contracture After Acquired Brain Injury, *Physiotherapy J*,2013;65(3):223-228.
10. **John , M . , Oropell ,O. ,Stephen ,M. &Vladimer , K. (2015):** ICU-Aquired Weakness and Early Mobilization in The Intensive Care Unit,3rd ed, Lange Co., Australia ;212-213.
11. **Khan , F. , Cheema , A. &Bhatti , Z. (2014):**Volkman's Ischemic Contracture; Post Circumferential Contracture of the Forearm,The Professional Medical J., 21(3):550-5 .
12. **Kay - Leigh , W., Trudel , G. &Laneu , O. (2015):** Non Inflammatory Joint Contracture Arising from Immobility, *Hindwai Publishing J.*, 44(1):2.
13. **Leung , J. , Harvey , L. & Moseley , A. (2013):** An Intensive Programme of Passive Stretch and Motor Training to Manage Severe Knee Contractures after Traumatic Brain Injury, *PMD J*, 65(3):223-8 .
14. **Leung , J. (2014):** Physiotherapy Management Of Contractures after Acquired Brain Injury,SydneyUniversity,Doctora thesis,
15. **Lewis, L., Dirksen, R., Kemper, M. & Bucher, L. (2014):** Medical-surgical nursing: Assessment and management of clinical problems, 9th ed. , Missouri: Mosby .
16. **Meltzer , S., Bar , B. & Phyllis , D. (2015) :** Brunner and Suddarths Text Book of Medical Surgical Nursing,8^{ed},Donnelly and sons Co.,;1911-1915- 2013- 24.
17. **Mohamed, F. (2010):** Psychological stress among ICU nurses and its relation with self efficacy in gvermental hospital in Giza District, Master in Psychology, Faculty of Education in The Islamic University .
18. **Nettina, S. (2014):** Lippincott Manual of Nursing Practice, (10th ed.), Philadelphia: Wolters Kluwer health, 729-33.
19. **Prabhu , R., Harvey, L. &Swamin , T.(2013):** Passive Movements for the Treatment and Prevention of Contractures, *Cochrance J*, 12(9):10.
20. **Segun , T. & Stephen , K. (2017):** Traumatic Brain Injury, *Physical Medicine and Rehabilitation Journal* , 1(32):10.
21. **Seliman , A, Morsy , W., Sultan , M. , Elshamy , K. & Hanaa , E. (2014):** Impact of A designed Head

Trauma Nursing Management
Protocol on Critical Care Nursing
Knowledge and Practices at
Emergency Hospital Mansura
University, American science J.
;10(12),13.

22. **Smeltzer, S.C., Bare, B.G., Hinkle, J.L. & Cheever, K.H. (2013):** Text book of medical surgical nursing (11thed.). New York: Lippincott Williams & Wilkins. 874-75.
23. **Soudagar, S., Rambod, M. & Beheshtipour, N. (2015):** Factors associated with nurses' self-efficacy in clinical setting in Iran, Iran J Nurs Midwifery Res. Mar-Apr, 20(2): 226–31.
24. **Stephanie , D. & Herbart , S. (2017):** Contracture Treatment and Management, Medscap J., 4(1):4-7.
25. **Thomas, B. (2008):** Managing contracture in long term care , Archieve. J Emerg Med;4(9): 31–5

Winkler, J.V., Rosen, P., & Alfry, E.J.(1984): Pre hospital Use of the Glasgow Coma Scale in Severe Head Injury. J Emerg Med;2:1–6.