



Neurological Assessment Skill Competency of Registered Nurses in Traumatic Brain Injury Patients: A Pre-Experimental Design

Nazia Yousef*, Muhammad Hussain and Kousar Perveen

Department Of Nursing, Faculty of Allied Health Sciences, University Of Lahore, Pakistan

*Corresponding e-mail: Naziayousif19@gmail.com

ABSTRACT

Objectives: To assess the effect of educational pedagogy on the skill of nurses in the neurological assessment of traumatic brain injury patients. **Methods:** This pre-experimental, one-group pre-post-test study investigated the effect of an educational pedagogy on 36 registered nurses of the trauma center, general surgery, and neurosurgery department of a tertiary care hospital. 20 items validated competency checklist was used to assess the skill of nurses before and after educational training regarding Neurological (Glasgow Coma Scale) assessment of TBI patients. **Results:** Frequency and percentages of demographic and professional variables were checked. 36 (100%) of the nurses showed incompetent skills practice and having scored from 0 to 13. The post-test results of the study illustrated that 7 (19.4%) nurses having scores 0 to 13 and had incompetent skill practices. 29 (80.6%) nurses having scored from 14 to 20 and had competent skills practice. Mean ($\bar{X}_1=16.916$) of the posttest skills score was significantly higher than the mean ($\bar{X}_2=12.583$) of the pre-test skills score. **Conclusion:** Before and after educational training there is a significant paired mean difference in skill competency of nurses. Hence the educational intervention was effective in improving the skills competency of registered nurses in neurological assessment.

Keywords: Traumatic Brain Injury (TBI), Skill competency, Glasgow Coma Scale (GCS), Nursing assessment

INTRODUCTION

Traumatic Brain Injury (TBI) is the disruption of normal brain function due to external injuries caused by blunt head trauma, accident, sudden bumps to the head, violent hitting of the head, or other causes that damage the skull and injured the brain tissues [1]. TBI is a leading cause of death and disability worldwide. Yearly, about 1.5 million people die from TBI, and those several million that survive receive emergency treatment [2]. Neurological injuries affect 1.4 million people per year in Pakistan [3].

Road traffic accidents and sports are two basic factors that lead to traumatic brain injuries. Traumatic brain injuries due to road traffic injuries are reported more as compared to other cases. The majority, 60% of the cases reported were due to road traffic accidents [4]. In contrast, the hospital-based statistics estimated Sports-related traumatic brain injuries ranging from 3.5 to 31.5 per 100,000. Besides, 170 per 100,000 sports-related traumatic brain injuries were reported on the community level [5].

The common presentation to the Emergency Department (ED) is with an acutely altered level of consciousness that requires quick assessment, which is the crucial action of all health providers [2].

Glasgow Coma Scale (GCS) was first introduced by Bryan Jennet and neurosurgery professors Graham Teasdale at the University of Glasgow. The Glasgow Coma Scale (GCS) provides an objective assessment of the level of consciousness in all types of medical and surgical patients during the neurological assessment. Three types of behaviours are assessed for eye-opening, motor, and verbal responses [6].

The GCS has 3 main domains of assessment of the level of consciousness, namely; eye-opening (E), verbal response (V), and motor response (M). The highest score is 15 and the lowest 3; (1-4) in eye-opening, (1-5) in verbal response, and (1-6) in motor response. GCS score ranges among the indicators of (13-15) mild brain injury, (9-12) moderate head injury, and (3-8) severe injury [7].

Over the past forty years, health care professionals are using the Glasgow Coma Scale (GCS) to examine the level of consciousness of patients. This scale is used to assess the neurological status of patients with different medical and surgical conditions like stroke or traumatic brain injuries or stroke. The GCS assessments also evaluate the progression of injury which is the main point for decision making in neurosciences [8]. GCS is also a fundamental scale for research studies [8].

Nurses and doctors both perform neurological assessments for different purposes. Doctors, most probably perform a neurological assessment to locate the affected site of the central nervous system, to make a diagnosis for the best treatment options [9].

However, nurses perform a neurological assessment to determine whether patients' neurological condition is intact or have some problem, assess the changes in the patient's neurological status in response to treatment, and to evaluate life-threatening conditions [10].

Neurological assessment is performed at the time of admission of the patient and then in each shift of duty to assess the effectiveness of treatment and for the need of medication. In the extent of critical care, regardless of advancement in technology, neurological assessment plays a crucial part in the diagnosis and management of unconscious patients [9]. Sound knowledge and efficient skill performance of nurses may help to deal with complexities of neurological assessment of unconscious patients with Traumatic Brain Injuries (TBI) [11].

The efficient nursing assessment was found associated with early patient's recovery in neuro and general surgery departments [1].

A study reported that nurses, working in the neurosurgery department have poor knowledge and practices about the Glasgow Coma Scale (GCS) assessment of unconscious patients. There is a need to conduct studies to explore the nurse's knowledge and skill about GCS assessment while working with patients in intensive care settings [1].

About 40% of all patients who admit to hospitals with traumatic brain injuries, rather than recover, their conditions get more worsen due to improper assessment and poor management [12]. Moreover, poor knowledge and inefficient skill performance of nurses were found associated with prolonging the hospital stay of patients in emergency departments and intensive care units [13]. Another study found that lack of knowledge and inefficient skill regarding the GCS assessment was related to the late recovery of patients in intensive care units [14].

Thus, to improve the ongoing traditional practices, there is a huge need of changing the learning pedagogies to enhance the knowledge and skill for ultimately best patients' outcome that is the utmost objective of nursing practices.

Regarding the significance of GCS as a reliable clinical tool for neurological assessment of patients, and the demand for attentive and uniform practices, evaluation of competencies is needed to ensure the standardized implication.

Objective

To assess the effect of educational pedagogy on the skill of nurses in the neurological assessment of traumatic brain injury patients.

METHODS

This quantitative approach with a pre-experimental, one-group pre-test post-test design included 36 registered nurses. Study subjects were selected from the trauma center, general surgery, and neurosurgery department of a tertiary care hospital in Lahore Pakistan. Ethical and research committee approval was taken from the University of Lahore, Lahore Pakistan. Signed consent was taken from all participants. And information taken from them is kept confidential. Diploma holder Nurses aged 25-50 who work in morning shift were included in this study. We excluded the nurses who had specialization in neurosciences and had planned to go for leave during the study period.

The study was conducted from April to June 2021. In pre-assessment clinical assessor assessed the Participants for skill competencies at their original working place by maintaining anonymity.

One week of educational training regarding the neurological assessment of Traumatic Brain Injury (TBI) patients by using the Glasgow Coma Scale (GCS) was given. This training program was validated and given by the expert of the relevant field. In training, session participants were taught for skill competence via. the simulated live adult

standardized patient. Four weeks were given for improving skill competence. Then participants were reassessed for skill changes.

Age and marital status were included as demographic variables. Professional variables in this study were the total year of job experience, several years working in a recent department, and department name. For neurological assessment (GCS) skill observation, a 20 items GCS competency checklist was used. Correctly performed skill step was marked under the category of “achieved” and the score was 1 and wrong or missed one step as “0” under the column of “Not achieved”. Skill competency was categorized as competent practices if score is 70%-100% (14-20 points) and incompetent practices if score are 0%-65% (0-13 points) [4]. The Cronbach’s alpha 0.723 and intra-rated reliability of the tool was reported as 0.86 [15]. SPSS version 20 was used for statistical analysis. Frequency and percentage were checked for demographic and professional variables. Data about skill competence was obtained twice, before and after the educational training session from one group. The collected data was in form of whole numbers to check the pre-and post-mean difference by applying paired t-test. Pre was coded as 1 and post as 2. The level of significance was set as ≤ 0.05 .

RESULTS

As a sample population, 36 individuals were chosen for the study from the Lahore General Hospital. 18 (50%) of nurses were single (unmarried), 14 (39%) nurses were married, 2 (5%) of nurses were divorced and 2 (6%) of nurses were a widow. 13 (36%) of the nurses are 25 to 30 years old. The age of the 9 (25%) nurses is 31 to 35 years. The age of the 8 (22%) nurses is 36 to 40 years. Only 6 (17%) nurses are above 40 years. The most 17 (47.2%) of the nurses have 2 to 5 years, 13 (36.1%) of the nurses have 6 to 10 years, 4 (11.1%) of nurses have less than 2 years and 2 (5.6%) of the nurses have more than 10 years of job experience. 8 (22.2%) nurses have less than 1 year, more than half 20 (55.6%) of nurses have 1 to 3 years, 7 (19.4%) nurses have 4 to 5 years and only 1 nurse has more than 5 years working experience in the recent department. More than half 20 (55%) nurses were working in Neurosurgery ICU, 10 (28%) of nurses were working in Surgical Unit, and 6 (17%) nurses were working in Trauma centers.

Table 1 is about the pre and post-skill competency scores of nurses regarding GCS assessment. In this table frequency and percentage of pre correct skill scores have been given.

Table 1 Neurological Assessment (GCS) Competency Response

Sr. No.	Competency checklist Items	Pre skills right scores	Post skills right scores
1	Performed hand washing	9 (25.0%)	19 (52.8%)
2	Correctly verified patient identification	6 (16.7%)	20 (55.6%)
3	Obtained consent about the procedure from patient or attendant	7 (19.4%)	22 (61.1%)
4	Maintain patient privacy during the procedure	8 (22.2%)	23 (63.9%)
5	Observe if eye open spontaneously	20 (55.6%)	29 (80.6%)
6	If patient is not opening his eyes, call patient’s name twice	34 (94.4%)	32 (88.9%)
7	(pressing the lateral part of the nail bed) for apply peripheral pain stimulus	31(86.1%)	34 (94.4%)
8	Ask about (time, place and person), to check patient’s orientation	30 (83.3%)	36 (100.0%)
9	Check for confused	31 (86.1%)	35 (97.2%)
10	Check for inappropriate words	29 (80.6%)	34 (94.4%)
11	Check for incomprehensible sounds	25 (69.4%)	35 (97.2%)
12	Check for None response	26 (72.2%)	33 (91.7%)
13	Check patient if obeys commands by instructing: (e.g. squeezing your hand, close/open eyes	24 (66.7%)	32 (88.9%)
14	Apply the central pain stimulus (trapezius squeeze), if a patient is not obeying command,	27 (75.0%)	33 (91.7%)
15	Observe if patient reacts to pain: (i.e. localizing, withdrawing, abnormal flexion and extension)	27 (75.0%)	31 (86.1%)

16	Have a nurse penlight or a torch for patient assessment of pupillary reaction. Check pupil size before the reaction to light and able to differentiate pupil reactions: (i.e., brisk, sluggish, or fixed)	27 (75.0%)	33 (91.7%)
17	Correctly perform assessment of limb movements and able to differentiate: Normal power; Mild weakness; Severe weakness; No movement; Abnormal posture (extension/flexion)	25 (69.4%)	34 (94.4%)
18	Summarize, interpret and report abnormal results of the GCS	24 (66.7%)	34 (94.4%)
19	Performed score aggregation	22 (61.1%)	31 (%)
20	Categorize the scores	21 (58.3%)	29 (%)

Table 2 Pre and post-educational intervention skills competency about GCS assessment of TBI patients by registered nurses (n=36)

Skills category	Skills score	Pre Skills score Frequency (%)	Pre Skills score Frequency (%)
Incompetent skills practices	0-13	36 (100%)	7 (19.4%)
Competent skills practices	14-20	0 (0%)	29 (80.6%)
Total		36 (100%)	36 (100%)

The pre-test results of the study show that 36 (100%) of the nurses show incompetent skills practice and having scored from 1 to 13 (Table 2). No one has scored from 7 to 13. No one had competent practice on neurological assessment. The results show the poor skill practices of nurses about the GCS Scale. The above table shows the post-test results of the study and illustrated that 7 (19.4%) nurses having scores 0 to 13 and had incompetent skill practices. 29 (80.6%) nurses having scored from 14 to 20 and had competent skills practice. The results show the good skills practices of nurses on neurological assessment.

Table 3 Paired t-test between pre and post-skill score about GCS assessment (n=36) (p-value=0.05)

Skills category	Mean	S.D	Mean difference	Paired t-value	Sig. value
Pre Test Skills score	12.583	2.687	4.333	8.519	0.000
Post Test Skills score	16.916	2.511			

Table 3 shows the mean ($\bar{X}_1=16.916$) of the post-test skills score is significantly higher than the mean ($\bar{X}_2=12.583$) of the pre-test skills score. It is a significant ($p<0.05$) difference between means ($\bar{X}_1-\bar{X}_2=4.333$). Hence the educational intervention was effective in improving the skills practices of registered nurses.

DISCUSSION

Healthcare providers who serve care for patients with different kinds of neurological traumas and pathologies may need an easy-to-use tool of assessment that should have validity and reliability of quick identification of such disorders. For this purpose neurological or GCS assessment of such patients is an essential tool for routine clinical practices in ICUs and emergency units.

The current study revealed the same results as previous studies Devi W, et al. and Enriquez, Catherine M., et al. showed the effectiveness of teaching programs regarding GCS for the assessment of neurological injuries [16,17]. The study revealed that the post-test mean score among staff nurses' skills regarding the use of the Glasgow Coma Scale was higher than the pre-test mean score among staff nurses. Which indicate nurses have improved their skill competence after teaching session and also revealed the importance of continuing nursing education?

Nurses working in neurosciences required evidence-based guidelines for the assessment of neurological injuries. The findings of this study were evident by a previous study, which was conducted by Delemos, Christi, that nurses of the neurological department have inconsistency and confusion when using the Glasgow Coma Scale in practice; this has

the potential to compromise care [4]. Clarity around the issues highlighted is necessary. Proper education to use GCS is important that is evident in the current study that after education scores on skill competency were increased.

The results of this study showed the same results as the previous study, revealed that eye-opening; motor response, verbal response, and the sum of GCS scores were based on evaluation of patients' clinical manifestations [18]. These factors can be evaluated by proper knowledge about current theory and practice interaction. If the nurses have the proper knowledge about appropriate sites for pain stimulation, use of the proper amount of time to accurately evaluate the GCS, an understanding of the importance of GCS assessment, and previous experience in using the GCS for patients with altered levels of consciousness, then they can perform assessment efficiently and can save the life of a patient who is dependent on nursing care.

The findings of the current study support the need for ongoing education of nurses for neurological assessments to increase skill and confidence in the assessment of neurological injuries which ultimately could increase the patient survival rate [19]. This study has the same results as the previous study reported in their study that there was a significant increase in overall post-survey scores (88.6 ± 13.3) vs. pre-survey scores (77.2 ± 16.7) ($p=0.001$) after the education. There was a significant increase in the ability to identify neurological assessment components and a significant increase in the ability to identify normal vs. abnormal neurological findings. A large percentage (90%) of the nurses perceived the education as beneficial, as this study showed a higher score in skill competency after the educational session.

Neurological assessment is part of the daily routine for most nurses working in neurology departments. This study confirms the results of a previous study that nurses with specialist education and training in neuroscience nursing have higher competence in consciousness assessment than nurses who only have basic education [20]. It was evident in this study that most of the participants have been using a standardized instrument and report the outcome of the assessment with both total scores and subscores.

CONCLUSION

This study was conducted to assess the skill competency of registered nurses in the neurological assessment of traumatic brain injury patients. It was concluded that education plays a vital role to improve practice. This study revealed that before educational pedagogy, nurses have a poor practice that prolongs the patient stay in the hospital and increases the burden on the hospital as well as society. After educational intervention skill scores of nurses increased, which ultimately improved the best patient outcomes.

DECLARATIONS

Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

REFERENCES

- [1] Bae, Ki Sook, and Young Sook Roh. "Training needs analysis of Korean nurses' neurological assessment competency." *Nursing & Health Sciences*, Vol. 22, No. 1, 2020, pp. 99-107.
- [2] Nguyen, Thi Hien. "The accuracy of Glasgow coma scale knowledge and performance among Vietnamese nurses." *Perspectives in Nursing Science*, Vol. 8, No. 1, 2011, pp.54-61.
- [3] Khan, Tanveer Ahmed, et al. "Prevalence and treatment of neurological and psychiatric disorders among tertiary hospitals in Pakistan; findings and implications." *Hospital Practice*, Vol. 48, No. 3, 2020, pp. 145-60.
- [4] Delemos, Christi, ed. "International perspectives in critical care nursing, an issue of critical care nursing clinics of North America, E-Book." Vol. 33, No. 1, *Elsevier Health Sciences*, 2021.
- [5] Dubey, Neha, and N. Kumar. "Assess the effectiveness of Computer Assisted Teaching (CAT) on knowledge gain about GCS with coma patient among B. Sc. Nursing 3rd year students of selected nursing colleges at Bhopal, Madhya Pradesh, India." *Trends in Nursing Administration and Education*, Vol. 8, No. 1, 2019, pp. 1-6.

-
- [6] Teasdale, Graham, and Bryan Jennett. "Assessment of coma and impaired consciousness: A practical scale." *The Lancet*, Vol. 304, No. 7872, 1974, pp. 81-84.
- [7] Waterhouse, Catheryne. "The Glasgow Coma Scale Pupils score: A nurse's perspective." *British Journal of Neuroscience Nursing*, Vol. 16, No. 2, 2020, pp. 89-92.
- [8] Teasdale, Graham, et al. "The Glasgow Coma Scale at 40 years: Standing the test of time." *The Lancet Neurology*, Vol. 13, No. 8, 2014, pp. 844-54.
- [9] Maher, Ann Butler. "Neurological assessment." *International Journal of Orthopaedic and Trauma Nursing*, Vol. 22, 2016, pp. 44-53.
- [10] Solari, Daria, et al. "Early prediction of coma recovery after cardiac arrest with blinded pupillometry." *Annals of Neurology*, Vol. 81, No. 6, 2017, pp. 804-10.
- [11] Greenshields, Sarah. "Neurological assessment in children and young people." *British Journal of Nursing*, Vol. 28, No. 16, 2019, pp. 1056-59.
- [12] Arsh, Aatik, et al. "Epidemiology of spinal cord injuries due to bomb blast attacks, managed at paraplegic centre peshawar, pakistan: A nine years retrospective study." *Khyber Medical University Journal*, Vol. 9, No. 2, 2017.
- [13] Yang, Yu'E., et al. "Consistency of postoperative pain assessments between nurses and patients undergoing enhanced recovery after gynaecological surgery." *Journal of Clinical Nursing*, Vol. 29, No. 7-8, 2020, pp. 1323-31.
- [14] Gage, Heather, et al. "Rationale and design of spiritt: A randomised controlled trial of a domiciliary-based specialist Parkinson's integrated rehabilitation team." *Parkinsonism and Related Disorders*, Vol. 18, 2012, pp. S154-55.
- [15] Kotfis, Katarzyna, et al. "Validation of the Polish version of the Critical Care Pain Observation Tool (CPOT) to assess pain intensity in adult, intubated intensive care unit patients: The POL-CPOT study." *Archives of Medical Science: AMS*, Vol. 14, No. 4, 2018, pp. 880-89.
- [16] Devi, W. Ashalata, and Manmaya Rana. "Effectiveness of a planned teaching programme on Glasgow Coma Scale among Nurses working in critical care units of selected hospital, Pokhara, Nepal." *International Journal of Nursing Education*, Vol. 10, No. 2, 2018, pp. 89-94.
- [17] Enriquez, Catherine M., et al. "Glasgow coma scale: Generating clinical standards." *Journal of Neuroscience Nursing*, Vol. 51, No. 3, 2019, pp. 142-46.
- [18] Kebapci, Ayda, Gul Dikec, and Serpil Topcu. "Interobserver reliability of Glasgow Coma Scale scores for intensive care unit patients." *Critical Care Nurse*, Vol. 40, No. 4, 2020, pp. e18-e26.
- [19] Jones, Candice. "Neurological nursing assessment education at Intermountain Medical Center: A quality improvement project." 2018.
- [20] Vink, Peter, et al. "Consciousness assessment: A questionnaire of current neuroscience nursing practice in Europe." *Journal of Clinical Nursing*, Vol. 27, No. 21-22, 2018, pp. 3913-19.

