

Impact of Glasgow Coma Scale training program on Nurses' knowledge and practice in the neurological department

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Abstract

Background: The neurological care nurse practices the Glasgow Coma Scale (GCS) as a consistent, reliable, and objective neurological tool used to assess the alteration in consciousness level. **Aim:** assess the impact of the Glasgow coma scale training program on nurses' knowledge and practice in the neurological department. **Research Hypotheses:** there will be significant differences in the total mean score knowledge and practice of neurological care nurses before and after implementing the training program. **Research design:** A quasi-experimental research design (single-group interrupted time series design). **Sample:** A convenience sample of 34 nurses who worked at neurological and stroke departments. **Result:** most of the studied sample (79.4%) were female. The total mean nurse's knowledge scores increased in the second assessment time as compared to the first assessment time ($18.5 \pm 2.81 - 2.60 \pm 4.36$) respectively. However, there was a slight decline in the third assessment mean knowledge scores to be 16.93 ± 3.01 as compared to the second assessment mean scores with a significant statistical difference between the three assessment times ($F/P = 236.994, 0.00.P \leq 0.05$). Also, the nurse's mean practice score regarding implementation of GCS in the second assessment was greater than the first assessment ($2.83 \pm 0.25 - 0.61 \pm 0.69$) respectively. Also there was a slight decline in the third assessment mean practice score to be (2.5 ± 0.7) as compared to the second assessment mean practice scores with a significant statistical difference between the three assessment times ($F/P = 131.100, 0.001.P \leq 0.05$). **Conclusion:** The mean knowledge and practice scores of the studied sample regarding the Glasgow coma scale after exposure to the training program was higher than before exposure and all the studied sample had unsatisfactory knowledge and practice before exposure while after exposure most of the studied sample had satisfactory knowledge and practice regarding GCS. **Recommendation:** activating the application GCS within the neurological departments with continuous training and supervision for nurses.

Keywords: Glasgow Coma Scale GCS, nurses' knowledge and practice, training program, neurological department

Introduction:

Consciousness is a term used to identify human awareness, alertness, being responsiveness, and attentiveness. This is the normal condition that should all humans present. Level of consciousness is one of the important neurological parameters that refer to patient deterioration or progress. The Glasgow Coma Scale (GCS) is one of the basic international standardized neurological assessment tools that are used for assessing the level of consciousness in all patients especially those with neurological problems. The GCS is an objective tool originally developed in 1974 by Graham Teasdale and Bryan Jennett at the University of Glasgow to assess consciousness level in a patient with head injuries but now, it is widely used to assess impairment in consciousness level in all

medical (as metabolic diseases, hepatic disorders, renal diseases), critically ill and trauma patients (Braine & Cook, 2016).

The GCS consists of three main components: best eye-opening, best motor, and best verbal responses to measure the patient responsiveness. The levels of response in the components of the Glasgow Coma Scale are 'scored' from 1, for no response, up to normal values of (4) for Eye-opening response, (5) for Verbal response, and (6) for Motor response. The sum score of the scale ranges from 3 which consider the lowest and the worst score which means deep coma and 15 which is considered the highest and a good score that means fully conscious. Each component of the three separately provides a clear, communicable representation of a

patient's condition (Al-Quraan & AbuRuz, 2016).

So, health care team especially those caring with neurological patients should considered the assessment of conscious level as a routine vital measurement or assessment like vital signs. The health care team ability to assess patients' status, determine any decline in patient condition and make clinical decisions depend on their ability to implement and practice GCS assessments, so it is critical for nurses as a member of the health care team to understand GCS. In addition, the nurse uses the four steps of check, observe, stimulate and rate while implementing GCS. Check: Examine factors affected or interfering with communication, ability to respond, and other injuries. Observe: eye-opening, content of speech and movement of the two sides of the body. Stimulate: sound spoken or shouted request. Physical: pressure on fingertip, trapezius or supra-orbital notch. Rate: assign according to the highest response observed. The nurse must be aware with the limitations that may alter the patient score of GCS such as sedation, alcohol, treatment, language barriers, paralysis, etc.... (Bhaskar, 2017)

Moreover, Glasgow Coma Scale nursing competency is a skill that is developed through practice and education. Neurological care nurses should be competent to monitor and record neurological observations and well-appointed with knowledge and clinical practice that ensure the quality of patient care, particularly those patients with disturbed conscious levels. One of the tools that the nurse should be competent against is Glasgow coma scale (Fukada, 2018). Therefore, the aim of the current research is to assess the impact of the Glasgow coma scale training program on nurse's knowledge and practice in the neurological department.

Significance of the study.

The nurse is the first line who contact with patients and can detect any changes of conscious level which is considered one of the important signs shows that the patient condition becomes more worsening or better especially for neurological patients. Fast and accurate assessment of conscious level changes especially the negative ones helps in the early detection of neurological complications and their management. moreover, the researcher

observed during the clinical practice in neurological department at one of the university hospitals that GSC as a tool for assessment was not included in the nursing documentation patient file, and nurses did not use Glasgow coma scale in patient assessment and did not aware with its importance and application.

Moreover, Singh, et al., (2016) reported that nurses working in emergency and outpatient departments had poor knowledge regarding the GSC. Also, the nurse role as an educator and counselor must assess the patient for early detection of health problems and demonstrate effective nursing intervention. Hopefully, as a nursing researcher in the medical surgical nursing specialty developed scientific background knowledge about GSC implementation, add an evidence-based nursing practice, and increases awareness of the health care team (nurses) regarding the implantation of GSC in patient care.

Al-Quraan & Aburuz (2016) stated that Jordanian nurses have insufficient knowledge to implement the Glasgow Coma Scale assessment and it is essential and required to develop learning courses in relation to Glasgow Coma Scale for Jordanian nurses. Kimboka (2017) added that nurses working at Intensive Care and Emergency Department at Muhimbili National Hospital have inadequate knowledge and practice level regarding the Glasgow coma scale with lack of continuous training and education which affect negatively on patients' outcomes because nurses will be unable to judge or make a decision regarding management of a patient with altered conscious level.

Aim of the study

This study aimed to assess the impact of Glasgow coma scale training program on nurses' knowledge and practice in the neurological department.

Subjects and Methods

Research Hypotheses

There will be a significant difference in the total mean score knowledge and practice of neurological care nurses before and after implementing the training program.

Research design:

A quasi-experimental research design (single-group interrupted time series design)

was utilized in this study. In this type of research design, the researchers collect data over an extended period before and after exposure to the training program.

Setting:

The present research was conducted in the Neurological and stroke departments at one of the university hospitals in Cairo. These departments riched by patients with deterioration in the level of consciousness, and the nurses need to be more oriented by a different assessment tool to assess this deterioration. Thus, enhancing the management plan and preventing further problems.

Sample:

A convenience sample of 34 nurses who worked at neurological and stroke departments' and were willing to participate in the study was included. They represent the total number of nurses working in the selected settings.

Tools for data collection

To achieve the purpose of this research, the following two tools were constructed and utilized for data collection.

First tool: Self-administered questionnaire. It was developed by the researchers in the Arabic language after an extensive review of related studies, research articles, web site, and relevant literature. It was developed to assess nurses' knowledge regarding the Glasgow coma scale. The questionnaire consists of two parts:

- a. Part one: it concerned with nurses' demographic data: it consists of 7 items covering data such as age, gender, level of education, job, years of experience in the neurological department, attended training program, and total years of experience
- b. Part two: 20 questions divided into 15 multiple choice questions and 5 true/false questions to assess nurses' knowledge regarding The Glasgow coma scale. It covered data such as indications, limitations, components, scoring, factor affecting GCS results, preparation, and implementation.

Scoring system: One score was allocated for each right answer and zero score for each wrong answer. Scores of less than 80 % (16 marks) were considered unsatisfactory knowledge levels.

Second tool: Pre/post-Glasgow coma scale observational checklist for nurses. It was adopted from Teasdale and Jennett (1974) and translated into the Arabic language by the researchers and revised by a panel of three experts. It is used to assess the level of consciousness and consists of 3 main items; eye response; motor response; and verbal response. The total items of GCS is 15 with a total score of 15 divided as 4 for best eye response, 6 for best motor response, and 5 for a best verbal response.

Scoring system: One score was allocated for each correct action and zero scores for incorrect action. Scores of less than 80 % were considered unsatisfactory practice level. The underlying reason for deciding 80% cut score is that GCS is one of the vital signs for a patient, so all nurses should be competent against it and had well practice and knowledge.

Tools validity and reliability

Content validity was done to identify the degree to which the used tools measured what was supposed to be measured. The developed tools were examined by a panel of three neurologists and adult health care nursing experts to determine the extent to which included items were clear and suitable to achieve the aim of the current study. As well, tools' reliability was calculated using SPSS with Cronbach's alpha value of 0.79 for the Knowledge Assessment Questionnaire.

Ethical consideration

Approval of the research conduction was obtained from the Research and Ethical Review Committee at the Faculty of Nursing Bader University in Cairo. In addition, the aim of the study was clarified to all participants, and confidentiality and anonymity were assured through coding the data, an informed consent was taken. Participants were informed that the obtained data will not be used in other research, and they had the right to withdraw at any time without any rational.

Procedure

Upon receiving the formal approval from the ethical committee at Faculty of Nursing, Badr University to conduct the current research, and other official permission was obtained to carry out this research. Three phases were involved to conduct the current

research, which are: designation, implementation, and evaluation.

The preparation phase: this phase involved: designing GCS program, and data collection tool construction. **Firstly:** the GCS program was constructed and designed in the Arabic language by the researchers after extensive literature review and revised by three panels of neurologists and adult health care nursing experts. The designed program was printed out and copied in a form of a handout. It included theoretical and practical parts: the theoretical part covered the knowledge regarding GCS origin, indication, uses, importance, grade, and limitations of its use. However, the practical part covered how to apply and fill out the Glasgow coma scale. Also, teaching materials were prepared such as PowerPoint presentations, videos about GCS implementation, and pre/post-tests. **Secondly:** Data collection tools were developed and tested for content validity.

The implementation phase: data of the current research were allocated from April 2018 to August 2018. Before implementing the training program the researchers assessed participants' knowledge through pre-test (using the self-administered questionnaire) and practices through (using nurses GCS observational competency checklist). The training program is provided to the participants through 2 sessions according to the nurses' schedule during the morning shift, the first session was devoted to knowledge regarding GCS. It covered data such as indications, limitations, components, etc..., the researchers used PowerPoint presentations, videos to explain and clarify the data for the nurses, it took about 20 minutes. The second session for practical part of GCS the researchers used the same strategies to teach the nurses how to apply it then observe the nurses during the application of the GSC on the patients, it took from 5:10 minutes.

The final step was **the evaluation phase:** the participant's knowledge and practice were evaluated before implementing, immediately after finishing the training program, and two months post-program by using a self-administered questionnaire and GCS competency checklist. A comparison of pre/post results was done.

Statistical Analysis

Data tabulated and analyzed using "Statistical Package for the Social Science" (SPSS program) version 18. Relevant statistical analyses were done to test the obtained data. Descriptive and inferential statistics were performed such as: mean and standard deviations; frequency; percentage; correlation coefficient and ANOVA. The level of significance was considered at $P \leq 0.05$

Results:

Table (1) represents that, most of the studied sample 79.48% were female. The age of more than one third 38.2% of the studied sample was ranged between 20 – 25 years. 47% took diploma and technical nursing institute. Two thirds of the studied sample 70.6% had less than 3 years of experience in neurological care department, all of the studied sample 100% did not attend any training program.

Figure (1) illustrates an obvious increase in the total mean knowledge scores in the second assessment time as compared to the first assessment time ($18.5 \pm 2.81 - 2.60 \pm 4.36$) respectively. However, there was a slight decline in the third assessment mean knowledge scores to be 16.93 ± 3.01 as compared to the second assessment mean scores. And there was a significant statistical difference between the three assessments ($F/P = 236.994, 0.000$).

Figure (2) explains that all of the studied sample 100% had unsatisfactory knowledge levels in relation to the Glasgow coma scale before implementing the training program. However, most of the studied sample 80% and around two-thirds 66.6% had satisfactory knowledge levels in the second assessment and third assessment time respectively.

Table (2) shows that all of the studied sample 100% gave correct answers regarding indications, the number of components, minimum score, maximum score, tracheostomy may affect on which result of GCS components, factors affect on GCS result, and to assess motor response start with painful stimuli in the second assessment. Also in the third assessment, all of the studied sample (100%) gave correct answers related to indications and a maximum score of GCS.

Figure (3) represents that nurses' mean practice score regarding implementation of GCS in the second assessment was greater than the first assessment represented (2.83 ± 0.25 - 0.61 ± 0.69) respectively. And there is a slide decline in the third assessment 2.5 ± 0.7

Figure (4) observes that the entire study sample 100% had unsatisfactory practice levels regarding implementation of GCS in the first assessment, however, most of the studied sample had satisfactory nursing practice regarding GCS implementation in the second assessment in percentages of 88.2%, while this percentage declined to 70.6 in the third assessment.

Table (3) reports that the most frequently actions done in the second assessment were: Observe if patient opens eyes spontaneously, observe if patient exhibit no verbal response, and Ask patient simple command and observes the response in the percentage of 100%. In the third assessment the most frequently done

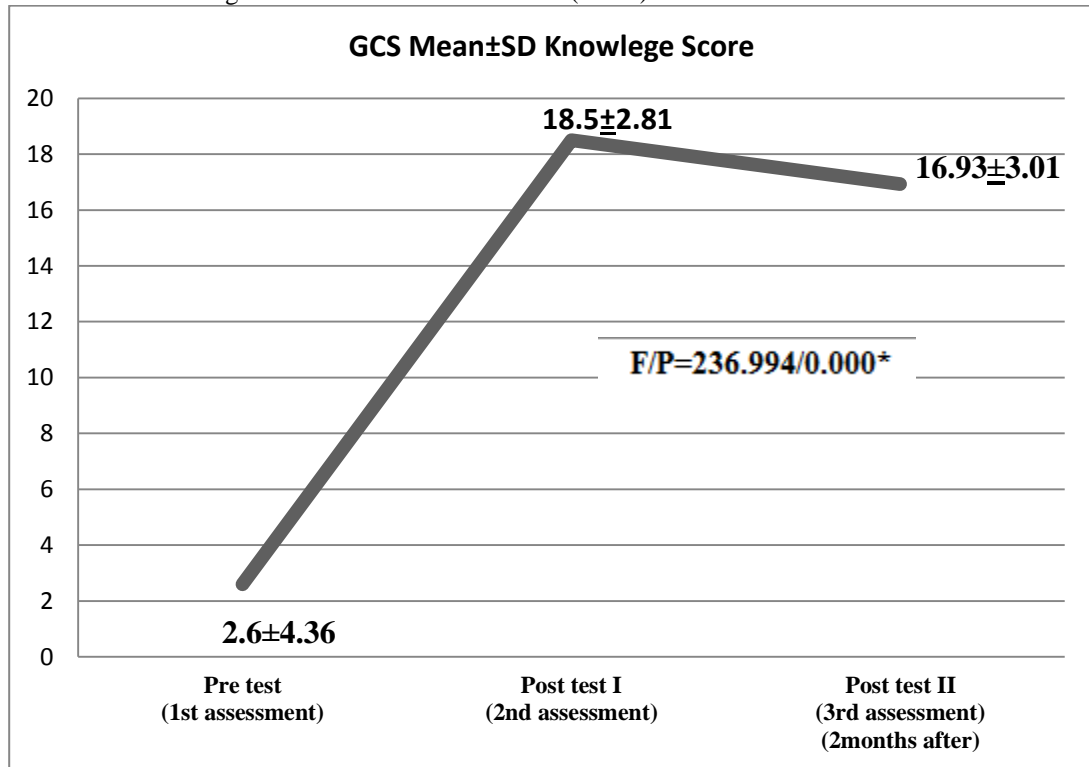
action was: observe if patient opens eye spontaneously, Calls patient twice and observe if patient opens eyes, Ask patient simple command and observes the response, and Apply central pain stimulus (ie. trapezius squeeze) & observes if the patient uses arm in an attempt to remove stimuli in the percentage of 91.2, 85.3, 100, & 88.2 respectively.

Table (6) shows a negative statistical significant correlation between the studied sample level of knowledge and age, years of experience represent ($r/p = -0.479^{**}/0.009$, $-0.436^{*}/0.018$) respectively in post-test I and there is a significant direct correlation between knowledge and level of education in post-test I ($0.472^{**}/0.010$) at the P value ≤ 0.001 . However, a significant direct correlation was found between nurse's practices and age, years of experience in post-test II represent ($r/p = 0.415^{*}/0.025$, $-0.416^{*}/0.025$) at the P value ≤ 0.05 level.

Table (1): Percentage Distribution of the Studied Sample as Regards to Demographic Characteristics (N= 34).

Variable	N	(%)
Gender		
Male	7	20.6%
Female	27	79.48%
Age		
20 – 25 years	13	38.2%
26 – 30 years	6	17.6%
31 – 35 years	5	14.7%
36 – 40 years	8	23.5%
40 – 45 years	2	6 %
X±SD	30.36±7.71	
Education		
Diploma	16	47%
Technical	16	47%
Bachelor	2	6%
Total Years of Experience		
1 – 5 years	13	38.2%
6 – 10 years	6	17.6
11 – 15 years	4	11.8%
16 – 20 years	11	32.4%
X±SD	10.80±7.88	
Experience in neurological department		
< 3 years	24	70.6%
3 – 5 years	7	20.6%
>5 years	3	8.8%
X±SD	2.66±3.88	
Attended Training courses as General		
Yes	0	0
No	34	100%

Fig. (1): Comparison between Total Nurse's Knowledge Mean Scores regarding Glasgow Coma Scale during the Three Assessments Times (N=34).



*Significant at the P value less than or equal 0.05

Figure (2): Percentage Distributions of the Studied Sample Knowledge Level about Glasgow coma Scale in the Different Assessment Times (N=34).

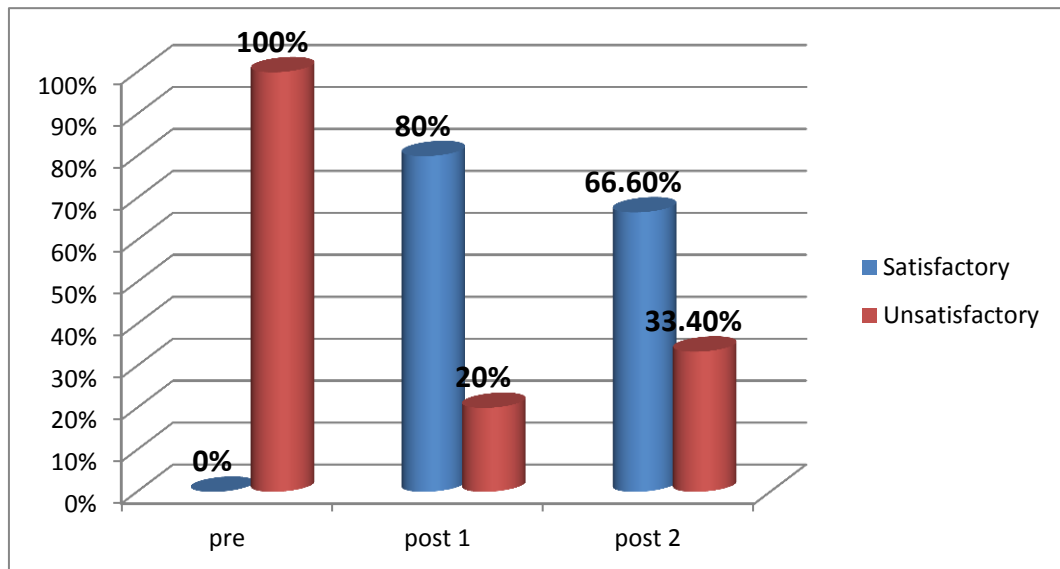


Table (2): Frequency Distribution of Correct Answers of the Studied Sample Regarding GCS (N=34)

GCS knowledge	Test	Correct Answers					
		Pre-test 1 st Assessment		Post-test I 2 nd assessment		Post-test II 3 rd assessment	
		N	%	N	%	N	%
Indication of GCS		3	8.8	34	100	34	100
Components of GCS		3	8.8	32	94.1	23	67.6
Number of the component		5	14.7	34	100	29	85.3
Minimum score		4	11.8	34	100	32	94.1
Maximum score		7	20.6	34	100	34	100
pt. Consider comatose at score of or below		3	8.8	29	85.3	26	76.4
Eye response nerve		4	11.8	25	73.6	18	52.9
Part of brain responsible about speaking		4	11.8	28	82.4	24	70.6
Steps help in GCS implementation		4	11.8	32	94.1	25	73.6
Before implement GCS nurse should check		5	14.7	32	94.1	31	91.2
Periorbital edema may affect on which result of GCS component		5	14.7	32	94.1	32	94.1
tracheostomy may affect on which result of GCS component		0	0	34	100	29	85.3
Factors affect on GCS result		3	8.8	34	100	25	73.6
Max. score of best motor response in GCS		3	8.8	29	85.3	26	76.4
Max. score of best eye response in GCS		5	14.7	31	91.2	26	76.4
Report of GCS score changes		0	0	23	67.6	22	64.7
To assess eye response start with verbal stimuli		5	14.7	31	91.2	28	82.4
To assess motor response start with painful stimuli		7	20.6	34	100	23	67.6
GCS score consider moderate in severity at 9-12		3	8.8	27	79.4	19	55.9
GCS done only for neurological patient		3	8.8	23	67.6	23	67.6

Figure (3): Nurses' Mean practices Scores Regarding GCS Implementation. (N=34)

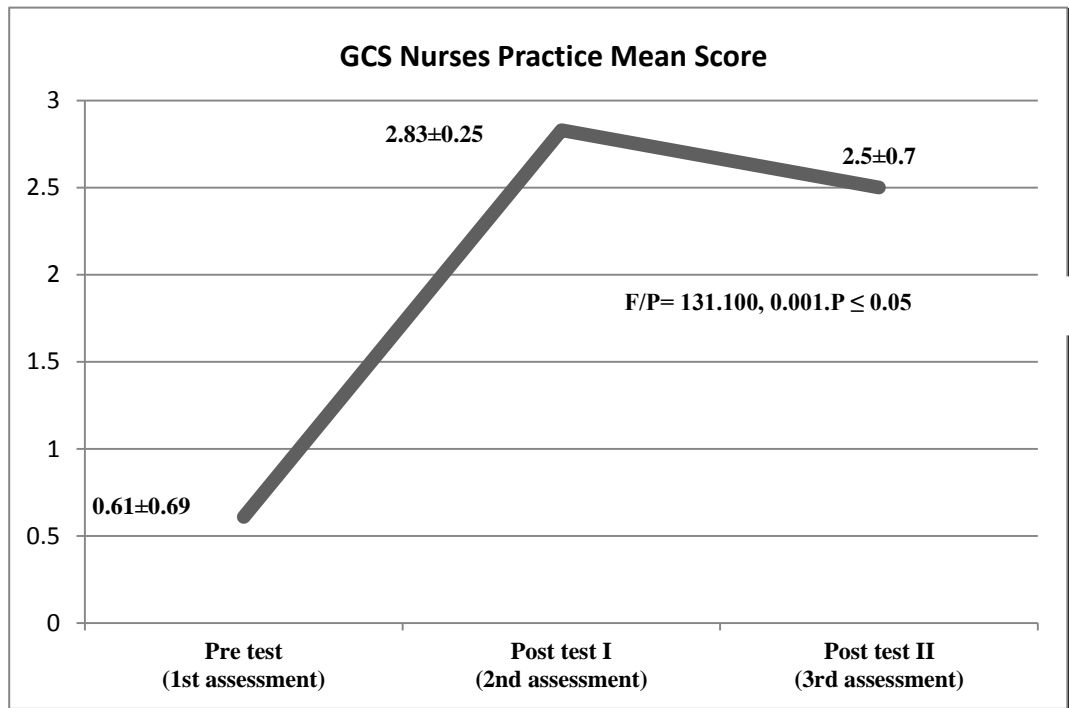
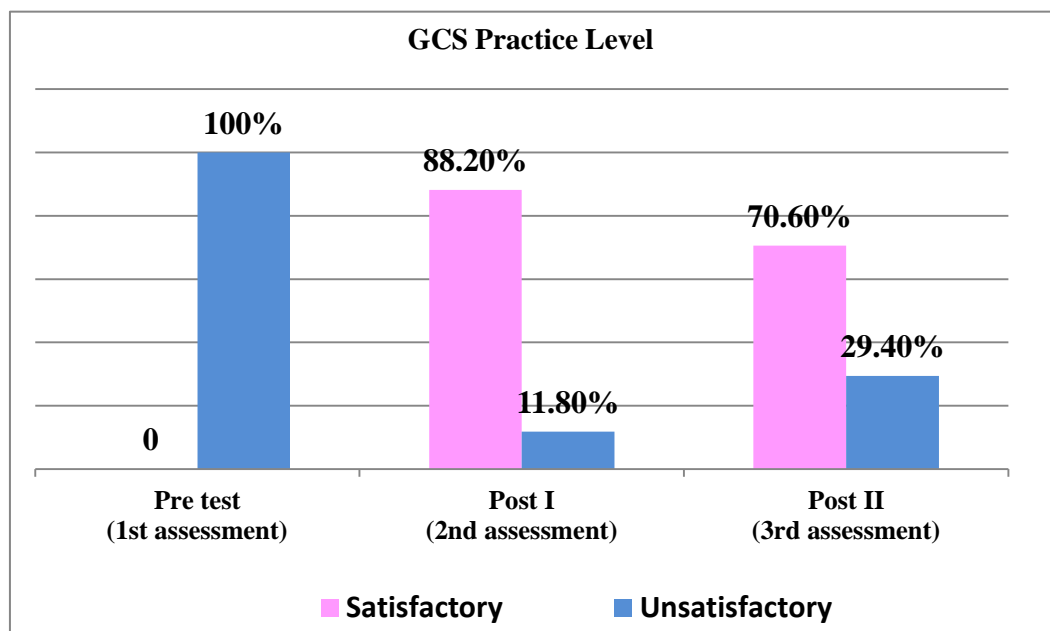


Figure (4): Percentage Distributions for Practice Levels regarding GCS in the Three Assessments Times of the Studied Sample (N=34).

(More than or equal is 80% satisfactory)

Table 3: Frequency Distribution of correct Actions of the Studied Sample Regarding the implementation of GCS. (N=34).

Test Component	Correct action					
	Pre-test 1 st Assessment		Post-test1 2 nd assessment		Post-test II 3 rd assessment	
	N	%	N	%	N	%
GCS components						
Best eye response						
Observe if pt opens eye spontaneously	2	5.9	34	100	31	91.2
Calls pt. twice and observe if pt. opens eyes	1	2.9	33	97.1	29	85.3
Apply peripheral pressure and observe pt. response	0	0	31	91.2	26	76.5
apply supraorbital pressure and observe pt. response	0	0	30	88.2	24	70.6
Best verbal response						
Ask pt. about name, time, place & observe oriented/ not	0	0	32	94.1	27	79.4
Observe if pt. is confused in 1 or 2 of time/place/person.	0	0	30	88.2	25	73.5
Observe if pt. talks in inappropriate and understandable words.	0	0	29	85.3	20	58.8
Observe if patient talks incomprehensible sounds	0	0	33	97.1	21	61.8
Observe if pt. exhibit no verbal response.	0	0	34	100	23	67.6
Best motor response						
Ask pt. simple command and observe the response.	1	2.9	34	100	34	100
Apply central pain stimulus (ie. trapezius squeeze) & observe if pt. uses arm in an attempt to remove stimuli	0	0	33	97.1	30	88.2
Observe if patient's arm withdraws to pain	0	0	31	91.2	25	73.5
Observe pt. arm flexion to the body in response to pain	0	0	30	88.2	22	64.7
Observe if there is flexion of arm away from body in response to pain	0	0	29	85.3	22	64.7
Observe if pt is flaccid and no response to pain	0	0	33	97.1	21	61.8

Table (6): Correlation between Demographic Characteristics, Knowledge and Practices scores of the Studied Sample.

Variables		Test	Age	Years of experience	Practices	Education
Nurses knowledge	Pretest	R	0.063	0.149	-0.022-	-0.248-
		P	0.739	0.430	0.909	0.187
	Post I	r	-0.479- ^{**}	-0.436- [*]	-0.288-	0.472 ^{**}
		P	0.009	0.018	0.123	0.010
	Post II	r	0.248	0.189	0.111	0.030
		P	0.194	0.326	0.560	0.879
Nurses practice	Pretest	r	-0.247-	-0.197-		0.468 ^{**}
		P	0.188	0.297		0.009
	Post I	r	-0.279-	-0.340-		0.276
		P	0.143	0.071		0.147
	Post II	r	0.415 [*]	0.416 [*]		-0.200-
		P	0.025	0.025		0.298

^{**}Significant at the P value ≤ 0.001 probability level

^{*}. Significant at the P value ≤ 0.05 probability level

Discussion

This study investigated the impact of Glasgow coma scale training program on nurses' knowledge and practice in the neurological department. Regarding the demographic characteristics: The result of the current study revealed that the majority of the sample was young adult females in accordance to Eric Erikson stages of psychosocial development theory (1950) in Wendy & Suzanne (2017) who delineated that the young adult age ranged between 19- 40 years. The current study findings regarding age supported by Santos, et-al (2016) as most of the nurses included in their study entitled as "assessment of nurse's knowledge about Glasgow coma scale at a university hospital" done on critical care nurses at a University hospital in Brazil were female with a mean age of thirty-one. Also, the current study concluded that most of the studied sample graduated from secondary school and technical institute of nursing with less than three years' experience regarding care of patients with neurological problems. The entire studied sample did not attend any training courses regarding GCS.

The current study demographic characteristic concerning education and GCS training courses consistent with a study done in one of the canal cities in Egypt on critical and emergency care nurses by Eldesouky (2016)

who report that the entire study sample was graduated from secondary school and technical institute of nursing, however, all of them not attend any training courses regarding GCS and more than two-third was young adult ranged between 20 – 40 year old. Hien & Chae (2011) illustrated in their study that, the majority of the sample was female this consistent with the current study demographic characteristics regarding gender. However, all the entire subjects had previous GCS education which was incongruent with the current study findings.

Regarding GCS nurses knowledge, the current study displayed that the entire studied sample had unsatisfactory knowledge level regarding GCS before they were exposed to the training program but this result positively changed after implementation of the training program as more than three-quarters of the included sample had satisfactory knowledge level immediately after finishing the program but this result declined about one fifth two months after with a significant statistical difference between the three assessment.

The underlying rationale for the decline in nurses' knowledge 2 months after the program is in accordance with Laskaris (2015) who explained based on the Ebbinghaus' Forgetting Curve that we forgot about 90% of what we have learned after one month. but

Wright (2018) explained that 70% of knowledge can be retained through on job training, 10 % by education, and 20% from interaction with other colleagues that matched exactly with what the researchers follow, as the researchers try to put knowledge into practice so around two-third of the studied sample able to memorize the two months pre-learned knowledge. The researchers' point of view regarding the unsatisfactory nurses knowledge level of the studied sample, it might be related to absence of training courses, lack of nursing conferences and references in Arabic language to help diploma and technical nurses to be up-to-date and overcoming the language barrier.

Moreover, Al-Quraan & AbuRuz, (2016) agreed with the current study result regarding nurse's knowledge before implementing the training program as they testified that Jordanian nurses at four hospitals in Amman-Jordan had unsatisfactory knowledge level regarding GCS and they recommended developing an educational program to increase nurse's knowledge and practice regarding GCS. Also, the current study findings come in line with a study done in one of the educational pediatric hospitals at Cairo by Hussein (2015) which revealed that pediatric care nurses had unsatisfactory knowledge about GCS in pretest but their knowledge in posttest improved after providing an instructional guidelines with statistically significant difference between pretest and posttest mean scores.

Furthermore, Teles, et al., (2013) reported in their study done on critical care nurses at a selected hospital in India to evaluate the effectiveness of self-instructional module regarding Glasgow coma scale on nurses' knowledge and skills that (74.55%) of the staff nurses had average knowledge and (25.45%) had poor knowledge regarding GCS in the pre-test. After the administration of educational program in post-test (69.09%) of nurses had good knowledge and (30.91%) had average knowledge. Also, Jaddoua, Mohammed, & Abbas, (2013) agreed with the current study finding as they stated in their study conducted at three hospitals in Baghdad to assess neurosurgical care nurses' knowledge regarding the Glasgow coma scale that the majority of nurses had inadequate knowledge regarding GCS. Additionally, Singh, et al.,

(2016) support the current study results as they highlighted on survey done at selected hospital in Malaysia that only 2.96% of nurses get score more than 80% regarding GCS.

The current study presented higher total mean practice scores among the studied sample regarding implementation of GCS after they were exposed to the training program as compared to those before the training with a significant statistical difference. The total mean scores were higher in the second assessments than the third assessments. All of the studied sample had unsatisfactory GCS practices before implementing the training program, while most of them had satisfactory GCS practices in the second assessment but there was a noticed around twenty percent decline in the third assessment as compared to the second one. From the researcher point of view the unsatisfactory GCS practices among the studied sample may be related to lack of experience related to caring of the neurological patient as more than two-third of the studied sample had less than three years of experience regarding this area, lack of continuous job training, unavailability of the scale format in nursing documentation, no follow up from the administrators about GCS use, also some participants reflect it so difficult, time consuming and its utilization is out of their duties.

The current study result is congruence with Hussein (2015) study who reported that nurses' skills about GCS improved after providing an instructional guideline with a statistically significant difference between pretest and posttest. The results of the present study were in accordance with Teles. et al., (2013) study they stated that, nurses' practice regarding implementation of GCS improved after administration of educational program about GCS implementation as (63.64%) of nurses had average skill and (36.36%) had good GCS skills.

Concerning the correlation between knowledge and practice, the current study revealed no significant correlation between nurses' knowledge and practice even after implementing the training program. However, there was a negative statistically significant correlation between the studied sample

knowledge and age, knowledge and years of experience in post-test I and there is a significant direct correlation between knowledge and level of education in post-test I. Also, the current study showed a significant direct correlation was found between nurses' practices and age, and practice and years of experience in post-test II. This may be due to increase the year of experience among the nurses which exposed for patient with different deterioration in the level of consciousness' that enhance their level of experience.

El desouky (2016) agreed with the current study result regarding the presence of no significant statistical correlation between nurses GCS knowledge and practice of critical care and emergency care nurse's. But this study finding contradicted with the current study regarding the correlation between knowledge, age, education, and years of experience, the study showed no significant statistical correlation between knowledge and age, knowledge and years of experience, and knowledge and education. Also Hussein (2015) disagreed with the current study result, the study found that there is a significant statistical correlation between nurse's knowledge and practice of pediatric care nurses regarding GCS.

Conclusion

Based on the findings of the current study, it can be concluded that all of neurological care nurses included in the current study had unsatisfactory GCS knowledge and practices level before implementing the training program as compared to after implementation. After implementing the training program an increment in nurses' knowledge and practice were recognized obviously in the second assessment followed by slight decline in the third assessment with a significant statistical difference between the three assessments, and most of the studied sample had satisfactory knowledge and practice level after implementation of the training program. This means that the training program was effective in raising the awareness of the nurse regarding GSC.

Recommendations

- Establishing ongoing and hands-on training programs to improve nurses' practices regarding GCS.
- Continuous supervision and follow-up of staff nurses by the head nurses and supervisors regarding GCS application
- Availability and activation of nursing documentation sheet regarding Glasgow coma scale.
- Further study should be done regarding nurses' knowledge, practice, and attitude regarding GCS.

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