



## **Knowledge and Utilisation of Glasgow Coma Scale in the Neurological Assessment of Children among Healthcare Workers in Jos Plateau State, Nigeria**

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### **Abstract**

All forms of acute medical and trauma patients can have their level of impaired consciousness measured objectively using the Glasgow Coma Scale. The purpose of this study is to assess the knowledge and Utilisation of the Glasgow coma scale in the neurological assessment of children among health workers in Jos University Teaching Hospital, Plateau State. A descriptive cross-sectional design was used for the study, using healthcare workers in Jos University Teaching Hospital as the target population. Ninety respondents participated in the research and the instrument used was a structured questionnaire; containing the socio-demographic variables of the respondents, knowledge of the Glasgow coma scale in the neurological assessment of children and Utilisation of the Glasgow coma scale in the assessment of children. Data was analyzed using the statistical package for social sciences (SPSS) using frequencies and percentages. Inferential analysis was carried out using Pearson chi-square of association. Findings of this research showed that the level of knowledge is fair (53.3%) and the Utilisation of the Glasgow coma scale in the neurological assessment of children was below average (43.3%). The result of the hypothesis tested showed a chi-squared value of 0.003 ( $P < 0.05$ ) indicating that there is a significant association between knowledge and Utilisation. The study highlights that the level of knowledge and Utilisation of GCS in the neurological assessment of children among healthcare workers is quite fair; hence, there is a need to boost the knowledge of the healthcare workers about the concept of Glasgow Coma scale in paediatrics and its proper Utilisation.

**Keywords:** Children, Glasgow Coma Scale, Healthcare workers, Neurological Assessment

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### **Introduction**

Neurological assessment can be viewed as a thorough examination of the nervous functional ability as it tends to assess the level of "consciousness, vital signs, papillary response, strength and equality of grasp and hand movement, feeling to touch and pain, and determination of any nervous system failure" (Bhowmik, 2019). The frequency of the assessment depends on the diagnosis of the patient, the presence of any chronic neurologic disorder and the functional capacity of the neurons, and this is a reliable way of recording the initial and subsequent level of consciousness in the patient's diagnosis especially those with brain injury (Craig *et al.*, 2022).

Glasgow Coma Scale (GCS) is a standardized tool used in measuring the neurologic assessment of patients and all forms of medical and acute trauma patients can have this objective assessment with the use of this tool as it measures three levels of their impaired consciousness revolving around eye-opening, verbal and motor responses (Jain & Iverson, 2022). The authors further stated that 'given the significance of GCS as a tool for neurological assessment of patients, it is essential to ensure uniformity, reliability, and accuracy in the use of GCS through careful and standardized application'. Further to this, Olson *et al.*, (2018) commented on the viability of the usage of the Glasgow Coma Scale for children older than five years with

no modification, and this assessment is intended either to monitor a child with an altered level of consciousness after a convulsion or monitoring a child at risk of raised intracranial pressure following a head injury. Emphasis on the need for healthcare practitioners to become proficient in the methods, skills, and techniques in assessing whether, at a conscious, moderate or comatose level recording accurate eye-opening, verbal and motor responses should be ascertained with appropriate tools in carrying out the examination (Jain & Iverson, 2022). Greenshields (2019) also emphasized that health professionals must be versatile with the necessary tools in clinical settings to carry out these neurological assessments on children with expertise; hence, there is a need for proper examination and documentation for hospitalized head trauma patients.

The prevalence of juvenile or pediatric traumatic brain injuries continues to rise despite safety and precautionary measures and middle and resource-poor countries are the most affected due to accidental injuries, and any alterations in the patient's nervous system health require neurological observations and/or evaluation with the use of Glasgow Coma Scale (Ugo, 2021; Elbaih & Safi, 2021)). Therefore; the knowledge of the Glasgow Coma Scale among healthcare workers is pertinent to accurate observations in assessing the neurological status of the children.

Against this backdrop, this study set out to assess the knowledge and Utilisation of the Glasgow Coma Scale in the neurological assessment of children among healthcare workers in Jos University Teaching Hospital (JUTH) Plateau State, Nigeria

#### **Specific Objectives of the Study**

1. To assess the knowledge of the Glasgow Coma Scale among healthcare workers in the neurological assessment of children in JUTH, Plateau State.
2. To ascertain the Utilisation of the Glasgow Coma Scale by healthcare workers in the

neurological assessment of children in JUTH, Plateau State.

#### **Research hypothesis**

H<sub>0</sub>: There is no significant association between the knowledge and Utilisation of the Glasgow Coma Scale in the neurological assessment of children among healthcare workers in Jos University Teaching Hospital (JUTH), Plateau State.

#### **Materials and Methods**

##### **Design**

The study adopted a cross-sectional research design in a bid to collect data at a point for the purpose of studying the phenomenon under consideration.

##### **Setting**

The study setting is Jos University Teaching Hospital (JUTH) located within Jos, Plateau State. JUTH is a tertiary health institution founded in 1975. It has a 600-bed capacity and the facility located in the Lamingo Area of Jos North Local Government Area (LGA). JUTH being a tertiary health facility has the following service delivery units; surgery, internal medicine, obstetrics and gynaecology, paediatrics, community medicine, radiology, nephrology, ophthalmology, pathology, laboratory medicine, otorhinolaryngology, anaesthesia, psychiatry, dentistry among others; however, this study targeted some specialized units which includes - Accident and Emergency, Pediatric, Neurological, High dependence (HDU) and the Intensive care units (ICU) of the hospital.

##### **Study Population**

The population of study for this research were health workers in Jos University Teaching Hospital (JUTH) in the Pediatric, Neurosurgical, Accident and Emergency, Intensive care Unit, and the High Dependence care units with an estimated population of 90 consisting of 58 Nurses and 32 Doctors.

##### **Inclusion Criteria**

The Nurses and physicians working in the aforementioned specialized units were qualified to participate in this study.

**Exclusion criteria**

Healthcare personnel working in other units aside from the specialized units were excluded as well as those on annual and maternity leave in the specialized units

**Sample and sampling technique**

The study was purposive and no sampling frame was adopted in picking the research participants; all members of the specialized units were considered equal to participate in this study in a bid to enhance the strength and reliability of the findings.

**Study instrument**

An adapted modified questionnaire instrument was used to collect data from the respondents. The questionnaire contained closed-ended questions with options to ascertain their knowledge and to the extent of Utilisation. It comprises three sections: Section A comprised the healthcare workers' socio-demographic characteristics, Section B was on the knowledge of the Glasgow coma scale in the neurological assessment of children and Section C looked at the Utilisation of the Glasgow coma scale among the respondents.

**Table 1 – Modified Glasgow Coma Scale Instrument**

	> 5 Years	< 5 Years
<b>Eye opening</b>		
E 4	Spontaneous	Spontaneous
E 3	To voice	To voice
E 2	To pain	To pain
E 1	none	none
C	Eyes closed (by swelling or bandage)	Eyes closed (by swelling or bandage)
<b>Verbal</b>		
V 5	Orientated ( in person or place or address)	Alert, babbles, coos, words or sentences to usual ability (normal)
V 4	Confused	Less than usual ability, irritable cry
V 3	Inappropriate words	Cries to pain
V 2	Incomprehensible sounds	Moans to pain
V 1	No response to pain	No response to pain
T	Intubated	Intubated
<b>Motor</b>		
M 6	Obeys commands	Normal spontaneous movements
M 5	Localises to supraorbital pain (> 9 months of age) or withdraws to touch	Localises to supraorbital pain (> 9 months of age) or withdraws to touch
M 4	Withdraws from nailbed pain	Withdraws from nailbed pain
M 3	Flexion to supraorbital pain (decerebrate)	Flexion to supraorbital pain (decerebrate)
M 2	Extension to supraorbital pain (decerebrate)	Extension to supraorbital pain (decerebrate)
M 1	No response to supraorbital pain (flaccid)	No response to supraorbital pain (flaccid)

Modified Quantifiable GCS Scores for Infants and Young Children (Adapted from Elbaih & Safi, 2021).'

**Validity of Research Instrument**

The instrument was adapted and modified in line with our cultural and clinical terrain; the

same was also given to experts in the neurological units who ascertained the face and content validity of the instrument.

### Reliability of Research Instrument

The reliability of the instrument was determined by conducting a pilot study which involved administering the questionnaire to a sample of a smaller similar population of 40 healthcare workers (Nurses and Doctors) in Bingham University Teaching Hospital (BUTH) Jos. A Cronbachs' Alpha reliability score of 0.7 was ascertained among the nurses and doctors on their knowledge and Utilisation of GCS.

### Method of Data Analysis

The data was subjected to both descriptive and inferential analysis. Data was analyzed using the statistical package for social sciences SPSS Version 25 using frequencies

### Results

**Table 2: Healthcare Workers Socio-demographic Characteristics**

VARIABLES	CATEGORIES	FREQUENCY	PERCENTAGE (%)
AGE	20-30years	15	16.7
	31-40years	32	35.6
	41-50 years	26	28.9
	50 years and above	17	18.9
<b>TOTAL</b>		<b>90</b>	<b>100</b>
GENDER	Male	39	43.3
	Female	51	56.7
<b>TOTAL</b>		<b>90</b>	<b>100</b>
SPECIFICATION	Nurses	58	64.4
	Doctors	32	35.6
<b>TOTAL</b>		<b>90</b>	<b>100</b>
ACADEMIC QUALIFICATION	RN, RM, BNSc, MBBS	57	63.3
	MASTERS	31	34.4
	PhD	2	2.2
<b>TOTAL</b>		<b>90</b>	<b>100</b>
YEARS OF EXPERIENCE	1-5	24	26.7
	5-10	29	32.2
	10 and above	37	41.1
<b>TOTAL</b>		<b>90</b>	<b>100</b>
UNITS	Accident & Emergency (A&E)	26	28.9
	Paediatrics	18	20
	Neurosurgical	21	23.3
	High Dependence Unit (HDU)	14	15.6
	Intensive Care Unit (ICU)	11	12.2
<b>TOTAL</b>		<b>90</b>	<b>100</b>

The Table above depicts that 15(16.7%) of the respondents were between the ages of 20-30

and percentages. Inferential analysis was carried out by using Pearson's Chi-square to test the hypothesis.

### Ethical Consideration

Approval to conduct the study was given by the Jos University Teaching Hospital ethical committee with the protocol reference number (JUTH/DCS/IREC/127/XXXI/582). The researchers explained the purpose of the study to the participants and assured them that the information provided would be treated with utmost confidentiality and anonymity. They were also assured that they could withdraw from the study if they so wished at any point without harm or prejudice.

years and 17(18.9%) were 50 years and above. Also, 51(56.7%) among the respondents were

females and 39(43.3%) were males. It shows that the majority of the respondents were Nurses 58(64.4%) and 32(35.6%) were Doctors. About sixty-three percent of the respondents had the RN, RM, BNSc, MBBS academic qualifications, 31(34.4%) had MSc, and 2(2.2%) had PhD degrees. It also shows that 24(26.7%) among the respondents had

experience of 1-5 years duration while 37(41.1%) had experience of 10 years and more. The study shows that 26(28.9%) of the respondents work in the accident and emergency unit, 18(20%) work in paediatrics, 21(23.3%) work in neurosurgery, 14(15.6%) work in HDU and 11(12.2%) work in ICU.

**Table 3: Knowledge of Glasgow Coma Scale in the Neurological Assessment of Children**

VARIABLES	CATEGORIES	FREQUENCY	PERCENTAGE (%)
Training about the use of GCS	Brief and superficial	22	24.4
	Thorough but without demonstration	41	45.6
	Thorough with demonstrations	27	30
<b>TOTAL</b>		<b>90</b>	<b>100</b>
The initial device of GCS usage	Locate brain tumour	5	5.6
	Assess the level of impaired consciousness following Traumatic brain Injury	69	76.7
	Facilitate care for stroke patients	7	7.8
	Monitor the extent of meningitis	9	10
<b>TOTAL</b>		<b>90</b>	<b>100</b>
The components of GCS	Eye-opening, verbal response, pupil response	5	5.6
	Eye-opening, verbal response, limb movement	25	27.8
	Eye-opening, verbal response and motor response	58	64.4
	Eye-opening, respiratory pattern, motor response	2	2.2
<b>TOTAL</b>		<b>90</b>	<b>100</b>
The minimum possible score for the Glasgow Coma Scale	0	8	8.9
	2	11	12.2
	1	14	15.6
	3	57	64.1
<b>TOTAL</b>		<b>90</b>	<b>100</b>
The maximum possible score for the Glasgow Coma Scale	15	79	87.8
	12	1	1.1
	11	2	2.2
	13	8	8.9
<b>TOTAL</b>		<b>90</b>	<b>100</b>
GCS as a component of the vital signs	True	69	76.7
	False	21	23.3
<b>TOTAL</b>		<b>90</b>	<b>100</b>

Glasgow coma scale score of --- and below is considered comatose	12	7	7.8
	11	12	13.3
	8	56	62.2
	10	15	16.7
<b>TOTAL</b>		<b>90</b>	<b>100</b>
Glasgow coma scale cannot assess an intubated child's level of consciousness	True	42	46.7
	False	48	53.3
<b>TOTAL</b>		<b>90</b>	<b>100</b>

(Source: field survey, 2023)

Table 3 above shows that 22(24.4%) of the respondents rated the quality of their training on the usage of GCS to be brief and superficial while 27(30%) rated their training as thorough with demonstrations. About six percent of the respondents reported that the Glasgow coma scale was devised to locate brain tumours and 69(76.7%) reported that the GCS was originally devised to assess the level of impaired consciousness following TBI. About eighty-eight percent of the respondents reported that the maximum possible GCS

score is fifteen while 2(2.2%) reported that it was eleven. Also, 7(7.8%) among the respondents reported that the children with a GCS score of twelve and below are considered comatose, 56(62.2%) reported that it was eight and below while 15(16.7%) reported that children with GCS score of ten and below were considered comatose. About forty-seven percent of the respondents agreed that the GCS cannot assess an intubated child's level of consciousness while 48(53.3%) were on the contrary.

**Table 4: Utilisation of the Glasgow Coma Scale in the Neurological Assessment of Children**

VARIABLES	CATEGORIES	FREQUENCY	PERCENTAGE (%)
Frequency of conduct on neurological assessment on children	Daily	26	28.9
	Weekly	42	46.7
	Occasionally	13	14.4
	Almost never	9	10
<b>TOTAL</b>		<b>90</b>	<b>100</b>
The Glasgow Coma Scale is utilised in the neurological assessment of children	True	60	66.7
	False	30	33.3
<b>TOTAL</b>		<b>90</b>	<b>100</b>
Frequency of the Utilisation of GCS in the neurological assessment of children	Daily	18	20
	Weekly	39	43.3
	Occasionally	22	24.4
	Almost never	11	12.2
<b>TOTAL</b>		<b>90</b>	<b>100</b>
Refresher course/training on the usage of GCS in the neurological assessment of children	Yes	36	40
	No	54	60

<b>TOTAL</b>		<b>90</b>	<b>100</b>
GCS score that usually requires intubation when airway reflexes are affected	10 or greater	7	7.8
	9	32	35.6
	8 or less	48	53.3
	11	3	3.3
<b>TOTAL</b>		<b>90</b>	<b>100</b>
Minimum GCS score for an intubated child	3T	35	38.9
	5T	6	6.7
	2T	40	44.4
	1T	9	10
<b>TOTAL</b>		<b>90</b>	<b>100</b>
Maximum GCS score for an intubated child	10T	43	47.8
	12T	7	7.8
	15T	34	37.8
	11T	6	6.7
<b>TOTAL</b>		<b>90</b>	<b>100</b>
TBI classification of a child that has suffered from head injury with the GCS score of 10(E3 V3 M4)	Mild brain injury	15	16.7
	Moderate brain injury	52	57.8
	Severe brain Injury	23	25.6
<b>TOTAL</b>		<b>90</b>	<b>100</b>
In practice, a reduction in the GCS score of--- is seen as a deterioration in consciousness level and requires prompt intervention.	1	3	3.3
	3	9	10
	8	62	68.9
	10	16	17.8
<b>TOTAL</b>		<b>90</b>	<b>100</b>

(Source: field survey, 2023)

Table 4 shows that 42(46.7%) reported that neurological assessments of children were conducted weekly, while 9(10%) reported it was almost never. Also, 60(66.7%) among the respondents agreed that the GCS is Utilised in the neurological assessment of children while 11(12.2%) stated it was almost never. Thirty-six (40%) of the respondents agreed to have taken a refresher course on the Utilisation of GCS in the neurological assessment of children, and the majority

54(60%) have not. Also, 7(7.8%) among the respondents reported that the GCS score usually requires intubation because the airway reflexes affected is ten or greater, 3(3.3%) reported a score of eleven while 48(53.3%) reported a score of eight or less. About seven percent of the respondents reported that the minimum GCS score for an intubated child was 5T while 40(44.4%) reported it was 2T. Forty-three (47.8%) of the respondents reported that the maximum GCS score of an

intubated child is 10T while 6(6.7%) reported that it was 11T. Also, 15(16.7%) among the respondents reported that a child who has experienced brain injury with a GCS score of 10(E3 V3 M4) is suffering from mild brain injury while 52(57.8%) reported the child was suffering from moderate brain injury. Lastly, 3(3.3%) of the respondents reported that in practice, a reduction in the GCS score of one is seen as a deterioration in consciousness

level and requires prompt intervention and 62(68.9%) reported it was a GCS score of eight.

#### Hypothesis Testing

Ho= There is no significant association between knowledge and Utilisation of the Glasgow Coma Scale in the neurological assessment of children among health workers in Jos University Teaching Hospital, Plateau State.

**Table 5: Pearson's Chi Square Association between Knowledge and Utilisation of the Glasgow Coma Scale in the Neurological Assessment of Children by Health Workers**

Utilisation of GCS in the Neurological Assessment of Children	Knowledge of GCS in the Neurological Assessment of Children		Total	Df	Critical Value	P-Value
Daily	15	20	35	3	8.5886	0.035
Weekly	22	10	32			
Occasionally	6	4	10			
Almost never	11	2	13			
<b>TOTAL</b>	54	36	90			

Significant level=0-05 and P-value (<0.05)

The calculated chi-square value of 8.5886 with 3 degrees of freedom and a P-value of 0.035 indicates that there is a statistically significant association between the knowledge of GCS and its Utilisation in the neurological assessment of children among healthcare workers in JUTH.

In this case, with a chi-square value of 8.5886 and 3 degrees of freedom, we compare this value to a chi-square distribution table to determine the level of significance. Since the P-value is less than the significance level of 0.05, we reject the null hypothesis and conclude that there is a significant association between the knowledge and Utilisation of GCS in the neurological assessment of children among healthcare workers in JUTH, Plateau State.

#### Discussion

The socio-demographic characteristics of the respondents indicated that the majority among the respondents were Nurses (64.4%) with RN,

RM, BNSc academic qualifications of 63.3% who had over 10 years of experience (41.1%). Also, the female respondents reflected a percentage of 56.7% with males having 43.3%. The study projected that the majority of the respondents (62.2%) reported that a child with a GCS score of 8 and below is considered comatose. However, only some of them (53.3%) agreed that the Glasgow coma scale can assess an intubated child's level of consciousness aside from other areas of assessment. This result is comparable to the finding of Singh *et al.*, (2017) who conducted a study on the assessment of Nurses' knowledge of the Glasgow Coma Scale in the Emergency and Outpatient Department in Egypt and found that 41.8% of the nurses had satisfactory knowledge on the GCS tool and more than half had poor knowledge in assessing GCS. Alhassan *et al.*, (2019) also documented a low level of knowledge of GCS among Ghanaian nurses in Neurological units of their hospitals.



The study generally projected that about sixty-seven percent (66.7%) of the respondents reported that the Glasgow coma scale is Utilised in the neurological assessment of children, and the majority (43.3%) among the said population reported that the Glasgow coma scale was currently Utilised in the neurological assessment of children weekly, and only a few among the respondents (40%) had taken refresher courses or training on the use of Glasgow Coma Scale in the neurological assessment of children as most of the respondents (60%) had not taken any refresher course on the subject of discourse which may hamper effective Utilisation. The findings of this study are consistent with the study of Audualem *et al.*, (2022) which aimed at examining the GCS assessment, practice and associated factors among 121 Nurses working in tertiary hospitals in Ethiopia, which showed that the overall assessment of GCS Utilisation was fair with the percentage of 47.1%. However, Kirshchen *et al.*, (2018) projected a good understanding being displayed by physicians in the performance of neurological assessments of children in pediatric cardiac intensive care units of hospital settings. Further to this, Kanwal *et al.*, (2021) in their study on the knowledge and practice of GCS among Nurses in Pakistan, their findings showed that, although Nurses had a poor level of knowledge of GCS; their performance in GCS Utilisation was quite good. The inconsistencies in the above results might be due to the different cultural terrain and settings where the studies were conducted.

The null hypothesis which states that there is no significant association between the knowledge and Utilisation of the Glasgow Coma Scale in the neurological assessment of children among healthcare workers in Jos University Teaching Hospital, Plateau State was thereby rejected after the inferential statistics were done (Pearson's chi-square tabulation) given that the P-value(0.003) is not greater than the significance level of 0.05; it indicates that there is indeed a significant association between the knowledge and Utilisation of the Glasgow coma scale in the

neurological assessment of children among healthcare workers in Jos University Teaching Hospital, Plateau State. The explanation may be due to the fact that most of the healthcare workers had not taken refresher courses/training on the Utilisation of the Glasgow coma scale in the neurological assessment of children and only a minority of them had a thorough training with demonstrations. However, Johnson *et al.*, (2020) reported a correlation between GCS and clinically important brain injuries in children – Seeing GCS as an important tool in the neurological assessment of children. Nurses' consistent use of acquired knowledge and correct interpretation of GCS scores will enhance the efficacy and practice of neurological assessment of children (Timothy & Anarado, 2022).

#### **Conclusion**

In conclusion, findings from this research study show that the level of GCS knowledge in the neurological assessment of children among healthcare workers in JUTH is fair and GCS was marginally Utilised in the neurological assessment of children. Therefore, there is a need to boost the knowledge of the healthcare workers about the concept of the Glasgow Coma scale and beef up its proper Utilisation in healthcare settings.

#### **Recommendations**

Based on the findings of this research, the following recommendations are put forward:

1. Healthcare workers should take refresher courses in order to broaden their knowledge on the Utilisation of the Glasgow Coma Scale;
2. Seminars and workshops should be organized for healthcare workers on the Utilisation of Glasgow Coma.
3. Healthcare workers should ensure that they have the enthusiasm to always learn and are ready to acquire up-to-date information about the Utilisation of GCS
4. Healthcare institutions should allow flexibility in the work schedule of its workers creating a space for study for those

who want to take on refresher courses on GCS Utilisation.

### Limitations of the Study

The study adopted a quantitative approach with the use of a questionnaire instrument; therefore, there was no thick description of the research scenario. Also, the study was delimited to one tertiary hospital in one local government area of the state.

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### Conflict of Interest to Declare

There is no conflict of interest to declare in the conduct of this study

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