ORIGINAL ARTICLE

Assessment of physicians' knowledge of glasgow coma score

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Abstract

Background: Glasgow Coma Scale (GCS) is the most commonly used tool in assessing comatose patients. It is simple, easily communicable, and useful in prognostication and determination of the treatment modality in head injury. Unfortunately, a high percentage of clinicians who are not in the emergency or neurological services are not conversant with this life-saving tool.

Objective: The objective of this study was to assess the level of knowledge of GCS among physicians practicing in a tertiary institution in South-East Nigeria, and to evaluate the call for a new and simpler scoring system.

Materials and Methods: This study was carried out using the instrument of a structured-questionnaire in Nnamdi Azikiwe University Teaching Hospital Nnewi, a federal government tertiary health institution in South-East Zone of Nigeria, which is a 350-bed facility employing about 550 medical doctors of different cadres.

Results: A total of 139 questionnaires were distributed to the doctors practicing in the institution who consented to participating in the study. The questionnaires were completed at the point of their administration and completed questionnaires were retrieved on the spot, and data were collated, and analyzed with the Statistical Package for Social Sciences, *SPSS version 17.0.* Statistical significance was calculated with the *chi square*, $P \leq 0.5$. The modal age group was 20-30 years 66 (48%), and most were resident doctors 99 (66.2%). One week prior to the questionnaire distribution, 56 (42.1%) had been actively involved in emergency care of patients, and 41 (30%) could not recall what GCS stood for. Medical and house officers showed a better knowledge of GCS.

Conclusion: There was a poor knowledge of GCS among a good number of physicians practicing in our setting and hence, continuing medical education on GCS is strongly advocated.

Key words: Head injury, inter-rater reliability, prognostication, trauma

Introduction

Glasgow coma scale (GCS), is the most commonly used coma scoring system.[1-3] It was described in Glasgow, Scotland by Graham Teasdale and Bryan Jenneth in 1974 with an original score of 14, and revised later to 15.[3-6] The GCS is the most commonly used tool in assessing comatose patients, besides other scoring systems like reaction level scale-85, and full outline of unresponsiveness.

It is objective, simple to apply and used for pre-hospital assessment of patients following trauma.[3,7,8] It helps in triage, and influences the treatment by physicians in the emergency department. Even beyond trauma, the clinical care of practically any condition whether metabolic, degenerative, infective or neoplastic, but which is associated with an affectation of the level of consciousness, is almost routinely monitored with the GCS.

This fact has probably informed the advocacy in some quarters that the scale should be more appropriately referred

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to as the Glasgow consciousness scale, since it does not monitor only comatose patients, but instead, evaluates the level of consciousness from 3 to 15.

The lack of adequate knowledge of the application of this tool would almost certainly impact negatively on the care of patients with impaired level of consciousness or under emergency circumstances as deterioration in clinical status may not be readily perceived until the situation becomes grave, if not irreversible.

Unfortunately, a high percentage of clinicians who are not in emergency or neurological services, after their formal graduate training, progressively lose touch with this life-saving tool, and this could negatively impact on the optimal care of patients. This impact on care could range from lack of knowledge on when to institute resuscitative measures to the lack of awareness of when to refer such patients for specialist neurological treatment.

The scale is also very important in the sense that it evaluates not only the neurological status following trauma, for which it was originally meant, but also the general clinical status of the patient which affects the nervous system both directly and indirectly, e.g. shock, hepatic coma, uremia, toxemia, drug abuse, etc., It, therefore, serves as a pointer to those who are making recovery and those who are in stagnant clinical status or in fact, those who are deteriorating. Its underutilization or improper use may, very likely, lead to sub-optimal or improper care of patients.

Though inter-rater reliability appears to be a major limitation of the scale, it most likely seems to arise from the possibility that an adequate knowledge of the scoring system may be lacking amongst the raters themselves, and not from any inherent defect in the tool itself.

The objective of this study was to ascertain the level of knowledge of the GCS tool among physicians practicing in a teaching hospital in South-East Nigeria, and evaluate the call for a new and simpler version of the tool.

There have been just a few studies on the knowledge of GCS among clinicians published from Nigeria, and indeed Africa, as most of the published studies were done either in Europe or North America. This study will, thus, contribute to the available body of knowledge on this subject matter in Nigeria, which is rather negligible.

Materials and Methods

This was a questionnaire based study carried out in Nnamdi Azikiwe University Teaching Hospital Nnewi, a federal government owned tertiary health institution in South-East Zone of Nigeria. The zone is composed of five states - Abia, Anambra, Ebonyi, Enugu and Imo - each of which has a federal health facility located within its confines. The institution is a 350-bed facility employing about 550 medical doctors, besides other health workers, providing tertiary health care services as well as undergraduate and postgraduate training and research in both medicine and the allied professions.

A total of 139 questionnaires were distributed to medical doctors who were involved in clinical practice in the institution, and who voluntarily accepted to partake in the assessment, with the confidentiality of the respondents ensured. They were required to complete the questionnaires at the point that they were administered without reference to any resource material, and the completed questionnaires were retrieved on the spot.

Data from the completed questionnaires were collated and entered into the Statistical Package for Social Sciences (SPSS) version 17.0 (IBM) for analysis. Respondents who correctly recalled the parameters of GCS were classified as having a "good knowledge," whereas those who could not correctly recall the parameters were classified as having a "poor knowledge."

Test of significance was done with the Chi-square, using $\leq 5\%$ (≤ 0.05) as the predetermined level of significance.

Results

Of a total of 139 respondents that participated in the study, 137 (99%) legibly filled in their ages, and the mean age group was 20–30 years (48.5%), whereas only one respondent (<1%) was aged above 50 years, [Table 1]. Most of the respondents were resident doctors in specialist training 99 (66.2%), while house/medical officers were 42 (30.2%).

The distribution of the respondents who legibly filled in their departments revealed that the highest number came

Table 1: Age distribution of respondents		
Age	Number	Percentage
Valid response		
20-30	66	47.5
30-40	62	44.6
40-50	8	5.8
>50	1	0.7
Subtotal 137	137	98.6
Invalid response		
2	2	1.4
Subtotal 2	2	1.4
Total 139	139	100

from internal medicine 22 (30.6%), followed by obstetrics and gynecology 18 (25%), pediatrics 16 (22.2%), surgery 14 (19.4%), and other departments were 2 (2.8%). Majority 77 (55%) of the respondents had graduated from medical school within 5 years prior to study, while 66% had additional training on GCS after medical school.

Fifty-six (42.1%) of the respondents had been actively involved in patient care in the Accident and Emergency Department in the 3 months prior to study, while 16 (12.2%) had not been actively involved [Table 2]. Over 115 (90.6%) had covered the Accident and Emergency Department in the preceding 5 years, before the study, as well.

Most of the respondents believed that GCS is a very important tool 108 (77.7%), and 130 (93.5%) acknowledged that they had received didactic teaching/lecture on the meaning and use of GCS. Yet, 41 (30%) of them could not even recollect what GCS stood for.

A little over half of the respondents, 75 (54%), could correctly describe all the variables and parameters of the GCS, whereas a little less than half, 64 (46%) failed one variable or parameter of the score or the other [Table 3]. In other words, barely 54% of our doctors who partook in the study had a good working knowledge of the GCS.

Eye opening response with its four-point parameters was the most easily remembered of the three clinical variables 120 (87%), while eye opening to call was the most easily missed of the four points. A total of 110 (79%) respondents got all the parameters in verbal response, but inappropriate word was the most missed by the respondents. About 99 (71.2%) of the respondents got all the parameters in the six-point best motor response correctly, however, abnormal flexion and withdrawal to pain were the most missed in motor response.

Majority of them, 127 (91.5%), did not know that the original GCS total score was 14 [Table 3]. There was no relationship between the level of training or rank of doctors and their recall of GCS, identified in this study, even though the House/Medical Officers appear to have a higher percentage of their numbers in good recall of GCS, followed by the resident doctors in training [Table 4].

Discussion

The GCS is easily the most used coma scoring system.[1-3] It is globally acceptable, simple to apply and objective.[3,5] It is easily communicable among physicians, and helps in taking decisions on the treatment modality for patients with head injury.[1,9] It is equally applicable in a whole lot of other disease states, both congenital and acquired, which are associated with cerebral impairment, way beyond trauma.

Table 2: GCS versus casualty posting in the last 3 months

GCS recall	<3 months casualty posting (%)	>3 months casualty posting (%)	Total
Correct	96 (69.1)	19 (13.7)	115
Incorrect	18 (12.9)	6 (4.3)	24
Total	114 (82)	25 (18)	139

GCS=Glasgow coma scale

Table 3: Distribution of respondents' knowledge of GCS

Response	Recall of GCS variables (%)	Knowledge of original GCS (%)
Correct	75 (54)	7 (5)
Incorrect	64 (46)	126 (90.7)
Not stated	0	6 (4.3)
Total	139	139

GCS=Glasgow coma scale

Table 4: Relationship between level of training and recall of GCS

Level of training	Correct (%)	Incorrect (%)	Total (%)
House/medical officer	32 (23)	10 (7.2)	42 (30.2)
Residents	64 (46)	28 (20.1)	92 (66.2)
Consultant	2 (1.44)	1 (0.72)	3 (2.2)
Total	98 (70.5)	30 (21.6)	137 (98.6)

GCS=Glasgow coma scale

Its limitations, however, include inter-rater variability, and the time and setting for the rating.[7,10] Despite the limitations the GCS has endured over the years as the most dependable coma scoring system. Its use transcends all clinical disciplines though it is most important in emergency situations.

Our study showed that the majority of the respondents were resident doctors in training (66.7%), which corroborated the work done by Adeleye, e*t al*., at the University College Hospital Ibadan, Nigeria, and Riechers, *et al*., at Walter Reed Army Medical Centre Washington DC USA.[5,11]

Most of the respondents in our study were within the age range of 20-40 years, and 77.7% of them agreed that the GCS is a very important clinical tool. About 42% had had contact with an unconscious patient within 1 week of the distribution of our questionnaires, yet, about 70.5% of the respondents could correctly recall what GCS stood for. This gap in knowledge is worse than was reported from a teaching hospital in North-East Nigeria by Yusuf, *et al*., and also 98% by Adeleye, *et al*., in South-West Nigeria.[12]

Both the North-East and South-West centers were, respectively, older institutions than ours and had neuroscience programs for much longer periods as well. Hence, generations of trainees and clinicians have been continuously exposed to the standard GCS protocols,

which may likely not be the case in centers without formal neuroscience programs or services, and this could have partly contributed to this gap in knowledge.

Irrespective of the successes of this time-enduring clinical tool, more work still needs to be done in order to determine the true picture of its knowledge in other institutions around our zone since our center is a tertiary institution and may not give a true reflection of the knowledge of GCS among clinicians at the other levels of healthcare delivery.

While most of the respondents (87%) could correctly score the eye opening response which is the most correctly recalled variable in our study, the most easily missed word in GCS was "Glasgow" (25.2%). These spelling mistakes ranged from Glassgow to Glasco, and this may be accounted for by the fact that at the point of first awareness of the word GCS, time was not taken to ensure that the correct words were learned by the trainee, especially in this part of the world where people tend to spell words as they are pronounced.

There was, however, an inverse relationship between recall of the clinical variables and their complexity. The six points of best motor response were the least remembered, while the four points of eye opening response were the most easily recalled. This is in keeping with the observation also made by Adeleye *et al.*, which prompted their call for a simpler coma scoring system for easy use in our day to day practice.

Our study did not find any relationship between the level of training and recall of GCS rather, a higher percentage of the respondents without any other formal training beyond the undergraduate medical education, that is house and medical officers, appeared to recall the details of the GCS better. This may be explained by the fact that these respondents without additional training were younger and fresher from the medical school. Apparently, as time passed, the older doctors and trainees progressively experienced decay in stored knowledge, due to loss of stimulation or challenge. This, perhaps, suggested another inverse relationship between the recall of GCS and number of postgraduation years from the medical school, with GCS recall worsening as the years increase.

Consequently, it is very likely that knowledge of GCS would be revived if attempts are made to continually challenge the mental recall of the GCS even after graduation from medical school. It, therefore, becomes imperative that active efforts be made in re-learning this important clinical scoring system especially by encouraging continuing medical education (CME) on the GCS, for every practicing clinician.

Conclusion

Physicians working in our setting, especially as increasing number of years are spent after graduation, have a poor level of knowledge, recall and possibly, application of the GCS system. Regular re-learning and revising of this invaluable clinical tool will go a long way in ensuring fairly correct evaluation of the neurological status of patients assessed by the tool.

We do not agree that there will be an improved recall of GCS from devising a new and simpler scale than would be realized from regular reminders at seminars and scientific meetings, since the present scale is simple and adequate enough. Therefore, since what appears to be the major problem is the time-bound decay that occurs with stored knowledge, our advocacy will rather be for the inclusion of refresher lectures on GCS in the curriculum of the regular CME programs beyond the medical school, now that such programs have become a prerequisite for the renewal of the physician's annual practicing license in Nigeria.

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Questionnaire Sample

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Questionnaire 1: Physicians' knowledge of the Glasgow coma scale clinical tool[7]

Physician survey: You are being kindly requested to participate in a survey of physicians' familiarity with a common used clinical tool. You have been selected because of the likelihood of many didactic teachings in use of the tool in the course of both your medical school and post graduate education. Your participation is voluntary and neither your name nor other personal identifiers will be needed for data analysis.

Your answer will remain anonymous if you choose to continue, please follow the instruction below. Please tick the correct option or fill out the answers to the best of your ability. No reference materials please.

A. Age (years)
    20–30{ }   30–40 { }   40–50 { }   >50 { }

    Current level of training
        (i) House Officer/Medical officer   (ii) Resident   (iii) Consultant   (iv) Others (Please specify)

B. Primary specialty(If any)

C. Number of years out of medical school
    < 5{ }   >5-10{ }   >10 { }

D. Duration of practice

E. Any additional formal medical training
    (1) Yes{ }   (2) No

F. If yes, please specify
    (1) Residency training   (2) Post graduate degree   (3) others

G. Duration of additional formal medical training
    < 5 years { }   >5–10 years { }   >10 years{ }

H. Last time actively involved in accident and emergency room care of patient
    i. <1 week { }   ii. >2 weeks { }   iii. <1 month   iv. <3 months   v. >3 months

I. Duration of active A and E coverage that you have had in your clinical practice
    < 5 { }   >5–10{ }   >10{ }

J. How often do you come in contact with unconscious patients?
    i. Very frequent   ii. Often   iii. Occasionally   iv. Rarely   v. Very rarely

K. How important do you think the Glasgow coma scale is in assessing unconscious patient
    (a) Very important   (b) Important   (c) Somewhat important
    (d) Not so important   (e) Never important

You are being asked to recall of commonly used GCS. Tell us what GCS stands for
    G………………   C…………………   S…………………

Are we correct in assuming that you must have received didactic teaching/lectures on the meaning and use of the GCS sometimes in your training
    Yes { }   No { }

The GCS relies on three clinical variables please name them. Assign the highest score for each clinical variable; list the score under each of the three clinical variables. You will recall that not all categories. You will recall that not all the categories receive six point. Please mark N/A (not applicable) where appropriate score variables

Clinical variable 1:
6...
5...
4...
3...
2...
1...

Clinical variable 2:
6...
5...
4...
3...
2...
1...

Clinical variable 3:
6...
5...
4...
3...
2...
1...

What is the total score for the original GCS
(a) 16{ }   (b) 15 { }   (c) 14 { }   (d) Not sure { }

Was there any modification?
(a) Yes { }   (b) No { }   (c) Not sure

If there was a modification, what was the addition/subtraction?
Adapted from *Adeleye, et al.*, with modifications.[7]