Original Article

Study of Simplified Coma Scales: Acute Stroke Patients with Tracheal Intubation

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Abstract

Background: Whether the Glasgow Coma Scale (GCS) can assess intubated patients is still a topic of controversy. We compared the test performance of the GCS motor component (GCS-M)/Simplified Motor Score (SMS) to the total of the GCS in predicting the outcomes of intubated acute severe cerebral vascular disease patients.

Methods: A retrospective analysis of prospectively collected observational data was performed. Between January 2012 and October 2015, 106 consecutive acute severe cerebral vascular disease patients with intubation were included in the study. GCS, GCS-M, GCS eye-opening component, and SMS were documented on admission and at 24, 48, and 72 h after admission to Neurointensive Care Unit (NCU). Outcomes were death and unfavorable prognosis (modified Rankin Scale: 5–6) at NCU discharge. The receiver operating characteristic (ROC) curve was obtained to determine the prognostic performance and best cutoff value for each scoring system. Comparison of the area under the ROC curves (AUCs) was performed using the *Z*-test.

Results: Of 106 patients included in the study, 41 (38.7%) patients died, and 69 (65.1%) patients had poor prognosis when discharged from NCU. The four time points within 72 h of admission to the NCU were equivalent for each scale's predictive power, except that 0 h was the best for each scale in predicting outcomes of patients with right-hemisphere lesions. Nonsignificant difference was found between GCS-M AUCs and GCS AUCs in predicting death at 0 h (0.721 vs. 0.717, $Z = 0.135$, $P = 0.893$) and 72 h (0.730 vs. 0.765, $Z = 1.887$, $P = 0.060$), in predicting poor prognosis at 0 h (0.827 vs. 0.819, $Z = 0.395$, $P = 0.693$), 24 h (0.771 vs. 0.760, $Z = 0.944$, $P = 0.345$), 48 h (0.732 vs. 0.741, $Z = 0.593$, $P = 0.590$), and 72 h (0.775 vs. 0.780, $Z = 0.302$, $P = 0.763$). AUCs in predicting death for patients with left-hemisphere lesions ranged from 0.700 to 0.804 for GCS-M and from 0.700 to 0.824 for GCS, in predicting poor prognosis ranged from 0.841 to 0.969 for GCS-M and from 0.875 to 0.969 for GCS, with no significant difference between GCS-M AUCs and GCS AUCs within 72 h ($P > 0.05$). No significant difference between GCS-M AUCs and GCS AUCs was found in predicting death (0.964 vs. 0.964, $P = 1.000$) and poor prognosis (1.000 vs. 1.000, $P = 1.000$) for patients with right-hemisphere lesions at 0 h. AUCs in predicting death for patients with brainstem or cerebella were poor for GCS-M (<0.700), in predicting poor prognosis ranged from 0.727 to 0.801 for GCS-M and from 0.704 to 0.820 for GCS, with no significant difference between GCS-M AUCs and GCS AUCs within 72 h ($P > 0.05$). The SMS AUCs (<0.700) in predicting outcomes were poor.

Conclusions: The GCS-M approaches the same test performance as the GCS in assessing the prognosis of intubated acute severe cerebral vascular disease patients. The GCS-M could be accurately and reliably applied in patients with hemisphere lesions, but caution must be taken for patients with brainstem or cerebella lesions.

Key words: Coma Scale; Consciousness Disorders; Intubation; Prognosis

Introduction

Coma scales are used to quantitatively evaluate patients with consciousness disorders, which can be easily accomplished by all health-care providers with high repeatability. The Glasgow Coma Scale (GCS) was first introduced in 1974 to assess coma and impaired consciousness in traumatic brain injury (TBI).[1] Although the GCS is widely applied in daily clinical practice, several limitations have been identified, such as an inability to accurately assess intubated patients and difficulty in assessing aphasic patients or aphonic

Access this article online

Quick Response Code:

Website: www.cmj.org

DOI: 10.4103/0366-6999.240813

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Received: 03-05-2018 **Edited by:** Peng Lyu

How to cite this article: Wang JP, Su YY, Liu YF, Liu G, Fan LL, Gao DQ. Study of Simplified Coma Scales: Acute Stroke Patients with Tracheal Intubation. Chin Med J 2018;131:2152-7.

patients due to the requirement of a verbal component. In addition, difficulty in assessment was noted in patients who have facial or ocular injuries that impede eye evaluation. Therefore, some researchers resorted to simplified coma scales, which excluded the verbal and eye-moving evaluation. In addition, lesser items may have less intra- and inter-rater reliability variation and better accuracy than the GCS. In 2003, Healey *et al*.[2] showed that the GCS motor component (GCS-M) contains virtually all the information of the GCS itself in predicting the outcome of TBI with intubation. Derived from the 6 points of the GCS-M scores, Gill *et al*.[3] came up with a simpler three-level assessment tool, named Simplified Motor Score (SMS) in 2005. In 2013, one meta-analysis involving 102,132 patients showed that SMS predicted outcomes with similar accuracy to the GCS in TBI.[4] Recently, one study showed that, in cases where the full GCS was difficult to assess, the GCS-M and SMS could be used safely to predict outcome in patients with TBI.[5] However, it remains undetermined whether these findings can be generally applied to intubated patients and coma patients due to other diseases. Here, we attempted to verify that the GCS-M or the SMS could be reliably used to assess the prognosis in acute severe cerebral vascular disease patients.

Methods

Ethical approval

The study was conducted in accordance with the *Declaration of Helsinki* and approved by the Ethics Committee of Xuanwu Hospital, Capital Medical University, Beijing (No. [2008] 03). As a retrospective study, this study was exempt from the informed consent from patients.

Study population

Acute severe cerebral vascular disease patients admitted to the Xuanwu Hospital Neurointensive Care Unit (NCU) were consecutively enrolled from January 2012 to October 2015. Inclusion criteria were ≥18 years old; brain computerized tomography confirmed ischemic or hemorrhagic stroke; symptoms onset within the previous 14 days; and with both conscious disturbance and endotracheal intubation. Exclusion criteria were mental illness or psychotic disorder; patients who had previous cerebrovascular events with sequela of dysphasia or dyskinesia; eyelid edema; and patients who had received anesthetics, sedatives, or neuromuscular blocking agents within the past 24 h.

Baseline data

Baseline data recorded when patients were admitted to the NCU included age, gender, stroke history and type of stroke (ischemic or hemorrhagic), and brain damage locations (left-hemisphere, right-hemisphere, and brainstem or cerebella).

Coma scoring

We recorded the GCS eye-opening component (GCS-E), GCS verbal component (GCS-V), GCS-M, GCS, and SMS on admission and at 24, 48, and 72 h after admission to the NCU. The GCS includes three components, GCS-E, GCS-V, and GCS-M, with a resulting score ranging from 3 (worst) to 15 (best). GCS-V was defined to be 0. SMS was classified into three degrees according to the patients' motor response (defined as obeys commands = 2; localized pain = 1; and withdrawal to pain or less response = 0). The rater recorded the best motor response from any limb.

Study outcomes

The modified Rankin Scale (mRS) was recorded on the day of discharge from NCU. An unfavorable outcome was defined as an mRS of 5 or 6, while a favorable outcome was an mRS of 0–4. Outcomes at discharge from the NCU, classified as either death or survival, were also recorded.

Statistical analysis

The SPSS statistical software (version 17.0 for Windows, SPSS Inc., Chicago, IL USA) and the software MedCalc® 15.2.2 (Frank Schoonjans, Mariakerke, Belgium) were used for statistical analysis. Descriptive analyses for continuous variables were used to calculate mean values and standard deviations, whereas frequencies were expressed as percentages.

Prognostic performance was tested by calculation of the receiver operating characteristic (ROC) curve and displayed in the area under the curve (AUC). AUCs between 0.9 and 1.0 were categorized as "outstanding," between 0.8 and 0.9 as "excellent," between 0.7 and 0.8 as "acceptable," and between 0.5 and 0.7 as "poor."[6] From ROC coordinates, the cutoff values for the aforementioned scores using the score value with the best Youden index (sensitivity + specificity − 1) were identified.[7] Comparison of the AUCs was performed using the *Z*-test. The positive predictive value and the negative predictive value were also calculated. All hypotheses were constructed as two tailed, and $P \leq 0.05$ was considered statistically significant.

Results

Characteristics of total population

A total of 106 patients were available for final analysis. The mean age of the study sample was 62 ± 12 years. Of 86 (81.1%) were male and 20 (18.9%) were female. A total of 32 (30.2%) had left-hemisphere lesion, 26 (24.5%) had right-hemisphere lesion, and 48 (45.3%) had brainstem or cerebella lesion. The median length of NCU stay was 14 (5–24) days. Forty-one (38.7%) patients died, and 69 (65.1%) patients had a poor prognosis when discharged from NCU.

Predictive performance of different coma scales

Differences of AUCs for GCS, GCS-E, GCS-M, or SMS in predicting death or poor prognosis lacked statistical significance among the four time points within 72 h admitted to NCU, suggesting that evaluation was feasible within 72 h of admission. Comparing GCS-M AUCs with GCS AUCs at the four time points, there was no statistically significant difference in predicting death at 0 and 72 h and in predicting poor prognosis at the four time points, suggesting that GCS-M had similar prognostic power to

GCS in assessing death at 0 and 72 h, as well as in assessing poor prognosis within 72 h. The cutoff values for GCS-M were 2 in predicting death (specificity 70% and sensitivity 70%) and 3 in predicting poor prognosis (specificity 89% and sensitivity 74%).

Subgroup analysis according to different brain damage locations

Left-hemisphere lesion

The AUCs of GCS, GCS-E, GCS-M, or SMS in predicting death or poor prognosis at the four time points had no significant difference, indicating that the predictive power of the above scores at four time points within 72 h admission to NCU were equivalent. Comparing GCS-M AUCs with GCS AUCs at the four time points, there was no significant difference in predicting death and poor prognosis at 0–72 h, indicating that GCS-M had similar predictive performance to GCS in predicting death and poor prognosis for patients with left-hemisphere lesion within 72 h admission to NCU [Table 1]. The cutoff values for GCS-M were 1 in predicting death (specificity 82% and sensitivity 66.7%) and 3 in predicting poor prognosis (specificity 100% and sensitivity 87.5%; Table 2).

Right-hemisphere lesion

The AUCs of GCS, GCS-M, GCS-E, and SMS in predicting death and unfavorable outcome were entirely maximal at 0 h and had significant differences with the other three time points, implying that 0 h was the best evaluation time point. No significant difference was observed between the AUCs of GCS-M and GCS in predicting outcomes at 0 h, which meant that the GCS-M and GCS had comparable prognostic value in predicting death and unfavorable outcome for patients suffering right-hemisphere lesion [Table 3]. The cutoff values for the GCS-M were 3 in predicting death (specificity 87.5% and sensitivity 100%) and unfavorable outcome (specificity 100% and sensitivity 100%; Table 2).

Brainstem or cerebella lesion

The AUCs in predicting mortality for GCS-E, GCS-M, and SMS were all <0.7, with no further analysis made. Each coma scale was equivalent in predicting unfavorable outcome within 72 h. No significant difference was observed between the AUCs of GCS-M and GCS in predicting unfavorable prognosis at four time points, demonstrating that the GCS-M was comparable to the GCS in prognostic power in predicting unfavorable prognosis within 72 h of admission to NCU [Table 4]. The cutoff values for the GCS-M in predicting poor prognosis were 4 or 5 (specificity 60–73% and sensitivity 78–91%), but the specificity and sensitivity were unsatisfactory [Table 2].

Discussion

The study found that the GCS-M approached the same test performance as the GCS for the prediction of death and unfavorable prognosis in acute severe cerebral vascular disease patients with intubation. The timing of the implementation of the evaluation within 72 h of admission to NCU was without distinction. The GCS-M had a similar predictive performance to the GCS in predicting death and poor prognosis for patients with left-hemisphere or right-hemisphere lesions, the cutoff points of which were 2 or 3 (specificity 60–100% and sensitivity 75–100%). The same was true for the GCS-M in predicting poor prognosis for patients with brainstem or cerebella lesions, and the cutoff points were 4 or 5 (specificity 60–73% and sensitivity 78–91%). However, the performance of the GCS-M in predicting death for patients with brainstem or cerebella lesions was unsatisfactory. Compared to the GCS, SMS performed poorly in general.

Accurate and complete GCS scores are difficult to obtain in many situations, for example, if the patient is intubated or has excessive swelling of the eyelids, thus impeding the performance of the GCS.[8] Recently, an international questionnaire-based survey including 48 countries showed that the method for recording GCS-V in intubated patients lacked standardization, where 67% would record the designation "T," 17% assign a score of 1 (V1), and 15%

Table 1: The receiver operating characteristic curve in predicting death and poor prognosis in patients with left-hemisphere lesions

Parameters	AUC			
	0 h (n = 14)	24 h (n = 25)	48 h (n = 29)	72 h (n = 26)
Death				
GCS	0.700 (0.405–0.908)	0.763 (0.552–0.908)	0.760 (0.566–0.898)	0.827 (0.629–0.946)
GCS-M	0.700 (0.405–0.908)	0.750 (0.538–0.900)	0.735 (0.539–0.881)	0.804 (0.602–0.932)
SMS	0.650 (0.358–0.877)	0.607 (0.393–0.794)*	0.576 (0.380–0.756)*	0.647 (0.437–0.823)*
GCS-E	0.675 (0.381–0.893)	0.721 (0.507–0.880)	0.701 (0.503–0.856)	0.739 (0.530–0.890)
Poor prognosis				
GCS	0.969 (0.718–1.000)	0.955 (0.789–0.998)	0.875 (0.699–0.968)	0.920 (0.744–0.989)
GCS-M	0.969 (0.718–1.000)	0.958 (0.794–0.999)	0.841 (0.658–0.949)	0.887 (0.701–0.977)
SMS	0.750 (0.455–0.936)*	0.667 (0.452–0.841)*	0.637 (0.439–0.806)*	0.708 (0.499–0.868)*
GCS-E	0.896 (0.619–0.993)	0.806 (0.599–0.935)*	0.799 (0.609–0.924)	0.830 (0.633–0.948)

Data were present as mean (95% *CI*). GCS: Glasgow Coma Scale; GCS-E: GCS eye-opening component; GCS-M: GCS motor component; SMS: Simplified motor score; AUC: Area under the receiver operator characteristic curve; *Coma scale whose AUCs were significantly different from AUCs of GCS, with P<0.05; *CI*: Confidence interval.

Table 2: Accuracy analysis of GSS-M in predicting death and poor prognosis

Items	Youden index	Cut-off points	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Left-hemisphere						
Death						
0 h	0.350	≤2	75.0	60.0	42.9	85.7
24 h	0.461	≤3	81.8	64.3	64.3	81.8
48 h	0.456	≤2	75.0	70.6	64.3	80.0
72 h	0.490	≤1	66.7	82.4	66.7	82.4
Poor prognosis						
0 h	0.875	≤2	87.5	100.0	100.0	85.7
24 h	0.875	≤3	87.5	100.0	100.0	81.8
48 h	0.681	≤2	76.5	91.7	92.9	73.3
72 h	0.702	≤2	78.6	91.7	91.7	78.6
Right-hemisphere						
Death						
0 h	0.857	≤3	100.0	85.7	66.7	100.0
Poor prognosis						
0 h	1.000	≤3	100.0	100.0	100.0	100.0
Brain stem or cerebella						
Poor prognosis						
0 h	0.444	≤4	77.8	66.7	87.5	50.0
24 h	0.506	≤5	90.6	60.0	87.9	66.7
48 h	0.515	≤5	87.9	63.6	87.9	63.6
72 h	0.598	≤5	87.1	72.7	90.0	66.7

GCS-M: GCS motor component; PPV: Positive predictive value; NPV: Negative predictive value.

Table 3: The receiver operating characteristic curve in predicting death and poor prognosis in patients with right-hemisphere lesions

Parameters	AUC			
	0 h (n = 9)	24 h (n = 20)	48 h (n = 22)	72 h (n = 24)
Death				
GCS	0.964 (0.612–1.000)	0.714 (0.472–0.891)	0.695 (0.465–0.871)	0.730 (0.511–0.889)
GCS-M	0.964 (0.612–1.000)	0.615 (0.375–0.821)	0.676 (0.446–0.857)	0.704 (0.484–0.871)
SMS	0.643 (0.280–0.913)*	0.577 (0.339–0.791)	0.600 (0.372–0.800)	0.600 (0.382–0.792)
GCS-E	0.929 (0.565–1.000)	0.769 (0.530–0.925)	0.638 (0.408–0.829)	0.693 (0.473–0.863)
Poor prognosis				
GCS	1.000 (0.664–1.000)	0.724 (0.482–0.897)	0.723 (0.494–0.890)	0.793 (0.580–0.929)
GCS-M	1.000 (0.664–1.000)	0.740 (0.498–0.907)	0.772 (0.546–0.922)	0.825 (0.616–0.948)
SMS	0.667 (0.299–0.925)*	0.583 (0.345–0.796)	0.607 (0.379–0.806)	0.607 (0.389–0.798)*
GCS-E	1.000 (0.664–1.000)	0.656 (0.414–0.851)	0.612 (0.383–0.809)	0.671 (0.452–0.847)

Data were present as mean (95% *CI*); GCS: Glasgow Coma Scale; GCS-E: GCS eye-opening component; GCS-M: GCS motor component; SMS: Simplified motor score; AUC: Area under the receiver operator characteristic curve; *Coma scale with AUCs that were significantly different from AUCs of GCS, with P<0.05; *CI*: Confidence interval.

assign a score of 0 (V0), leading to great variation in inter-rater reliability.[9] In contrast, a simplified assessment system could circumvent the above-mentioned issues and thus would be easier to operate while also more practical in clinical practice.

Previous studies have shown that the GCS-M could accurately assess the prognosis in TBI and cardiac arrest patients.[10,11] Our results showed that the GCS-M was a predictor of death or unfavorable outcome in intubated acute severe cerebral vascular disease patients (AUC 0.730 and 0.827), while its prognostic power was equivalent to that of the GCS. This was consistent with the Handschu *et al*.,[12] study (90 patients), in which the GCS-M had similar prognostic strength to the GCS in predicting morality in intubated acute severe cerebral vascular disease patients, though the AUCs were smaller than ours (GCS: 0.69 and GCS-M: 0.64). Hence, when the total GCS cannot be realized, we can adopt the GCS-M to assess coma and prognosis.

The brain damage locations may affect the prognostic performance of coma scales. For example, left-hemisphere and brainstem or cerebella lesions can influence the assessment of GCS-V. Thus, we conducted a stratified analysis of coma scales for patients with impaired left-hemisphere, right-hemisphere, and brainstem or

Table 4: The receiver operating characteristic curve in predicting death and poor prognosis in patients with brain stem or cerebella lesions

Parameters	AUC			
	0 h (n = 24)	24 h (n = 42)	48 h (n = 45)	72 h (n = 43)
Death				
GCS	0.651 (0.432–0.832)	0.702 (0.541–0.833)	0.711 (0.555–0.837)	0.721 (0.562–0.848)
GCS-M	0.676 (0.457–0.851)	0.660 (0.498–0.799)	0.660 (0.502–0.796)	0.683 (0.522–0.818)
SMS	0.576 (0.359–0.773)*	0.560 (0.398–0.712)*	0.612 (0.453–0.755)*	0.617 (0.455–0.763)*
GCS-E	0.622 (0.403–0.810)	0.671 (0.509–0.808)	0.725 (0.569–0.848)	0.727 (0.568–0.853)
Poor prognosis				
GCS	0.704 (0.484–0.871)	0.730 (0.571–0.855)	0.753 (0.600–0.871)	0.820 (0.670–0.921)
GCS-M	0.727 (0.508–0.887)	0.752 (0.594–0.872)	0.731 (0.577–0.854)	0.801 (0.649–0.908)
SMS	0.741 (0.523–0.896)	0.734 (0.576–0.859)	0.747 (0.593–0.865)	0.790 (0.637–0.900)
GCS-E	0.639 (0.419–0.823)	0.647 (0.484–0.788)	0.730 (0.575–0.853)	0.760 (0.603–0.878)

Data were present as mean (95% *CI*); GCS: Glasgow Coma Scale; GCS-E: GCS eye-opening component; GCS-M: GCS motor component; SMS: Simplified motor score; AUC: Area under the receiver operator characteristic curve; *Coma scale with AUCs that were significantly different from AUCs of GCS, with P<0.05; *CI*: Confidence interval.

cerebella. The results showed that the GCS-M has a similar predictive performance to the GCS in predicting outcomes for patients with left-hemisphere or right-hemisphere lesions and brainstem or cerebella lesions, except for predicting death in patients with brainstem or cerebella lesions. This finding could be explained by the possibility that quadriplegia accounted for a large proportion (65%) of patients with brainstem or cerebella lesions, thus shadowing the performance of GCS-M. Therefore, we should take brain damage locations into account when employing GCS-M to assess prognosis in intubated acute severe cerebral vascular disease patients, as it would be more accurate and reliable when applied in patients with hemisphere lesions; however, caution must be taken if evaluated patients had brainstem or cerebella lesions.

In 2005, Gill *et al*.[3] first proposed SMS and concluded that SMS demonstrated a test performance similar to the total GCS score for the prediction of in-hospital mortality in TBI (AUC: 0.878 vs. 0.906). However, SMS did not show any advantage in this study (AUC <0.700). This may be because SMS is too simple to reflect the complexity of neurologic deficits in acute severe cerebral vascular disease patients. Therefore, the SMS was not recommended for the evaluation of acute severe cerebral vascular disease patients with intubation.

There are two main limitations in this study. First, the study was a retrospective analysis of a prospectively collected database and thus lacked a more rigorous design. Second, it was a single-center study and had a small sample size. A larger sample from a multicenter clinical study is needed, and our results should only be used as a reference for clinicians.

In conclusion, the study suggested that the GCS-M can accurately predict the prognosis of intubated acute severe cerebral vascular disease patients as with the GCS. However, this was not for the patients with brainstem or cerebella lesions.

Financial support and sponsorship

The study was supported by grants from the National High Technology Research and Development Program of China (863 Program, No. 2015AA020514) and the National Natural Science Foundation of China (No. 81671037).

Conflicts of interest

There are no conflicts of interest.

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简化昏迷量表评估研究：急性脑血管病伴气管插管患者

摘要

背景：格拉斯哥昏迷评分（GCS）是否可用于评估气管插管患者一直存在争议。我们致力于明确简化昏迷评分是否能够取代GCS预测急性重症脑血管病伴气管插管患者预后。

方法：回顾性分析前瞻性收集的2012年1月–2015年10月收入首都医科大学宣武医院神经内科监护病房（NCU）的106例急性重症脑血管病伴气管插管患者的资料。记录每个患者入住NCU 0h、24h、48h、72h的GCS及GCS运动反应项（GCS-M）等组分、简化运动评分（SMS）。记录出院时的结局：生存/死亡和预后良好/预后不良（改良mRS 5–6分）。用受试者工作曲线下面积（ROC）表示各昏迷评分预测预后的效能并确定预测预后较为准确的界值。两个ROC曲线下面积（AUC）的比较采用*Z*检验。

结果：本研究纳入106例急性重症脑血管病伴气管插管患者，出NCU时41例(38.7%)死亡、69例（65.1％）预后不良。除了各昏迷评分在0h预测右侧大脑半球受损患者预后的效能最佳，各个昏迷评分在入住NCU 72小时内的预测效能无差异。0h GCS-M（0.721 *vs*. 0.717, z=0.135，p=0.8 93）、72h GCS-M （0.730 *vs*. 0.765, z=1.887，p=0.060）预测死亡的效能与GCS相当。0h GCS-M（0.827 *vs* 0.819, z=0.395，p=0.693），24h GCS-M（0.771 *vs* 0.760, z=0.944，p=0.345），48h GCS-M（0.732 *vs* 0.741, z=0.593，p=0.590）和72h GCS-M（0.775 *vs* 0.780, z=0.302，p=0.763）预测预后不良的效能与GCS相当. 亚组分析：0h GCS-M（0.700 *vs* 0.700, z=0.000，p=1.000），24h GCS-M（0.750 *vs* 0.763, z=0.684，p=0.494），48h GCS-M（0.735 *vs* 0.760, z=0.834，p=0.404）和72h GCS-M（0.804 *vs* 0. 827, z=0.725，p=0.468）预测左侧大脑半球受损患者死亡的效能与GCS无统计学差异。0h GCS-M（0.969 *vs* 0.969, z=0.000，p=1.000），24h GCS-M（0.958 *vs* 0.955, z=0.151，p=0.880），48h GCS-M （0.841 *vs* 0.875, z=0.922，p=0.356）和72h GCS-M（0.887 *vs* 0.920, z=0.846，p=0.398）预测左侧大脑半球受损患者预后不良的效能与GCS无统计学差异。0h GCS-M 预测右侧大脑半球受损患者死亡 (0.964 *vs* 0.964, z=0.000，p=1.000) 和预后不良(1.000 *vs* 1.000, z=0.000,p=1.000) 的效能与GCS无统计学差异。GCS-M预测脑干小脑受损患者死亡的效能较低(AUCs<0.700)。 0h GCS-M（0.727 *vs* 0.704, z=0.831，p=0.406），24h GCS-M（0.752 *vs* 0.730, z=1.283，p=0.200），48h GCS-M（0.731 *vs* 0.753, z=0.694，p=0.488）和72h GCS-M（0.801 *vs* 0.820, z=0.525，p=0.599）预测脑干小脑受损预后不良的效能与GCS无统计学差异。SMS 的预测预后的效能较低(AUCs <0.700).

结论：GCS-M预测急性重症脑血管病伴气管插管患者死亡或不良预后效能与GCS相当。考虑GCS-M可用于预测左侧大脑半球和右侧大脑半球损伤患者的预后，但对小脑脑干受损患者慎用。