

Determining the Utility of the Full Outline of Responsiveness Scale as compared to the GCS in the Care and Monitoring of NeuroCritical Care Patients

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1 Background

The Glasgow Coma Scale (GCS) is a widely adopted method of assessing the neurological status of a patient. The inability to assess verbal score of patients who are intubated and failure to test brainstem reflexes are 2 limitation of the GCS when used serially in the critical care environment. With these limitations in mind, the Full Outline of UnResponsiveness score was developed to trend coma states in the critically ill. Nurses in a 24 bed Neurocritical Care unit have been performing and recording both scores simultaneously for 3 years.

The FOUR Score:

- Consists of four components (eye, motor, brainstem, and respiration), and each component has a maximal score of 4 (Wijdicks et al, 2005, pg. 585). This is described in the figure below which consists of all four categories and their respective scoring criteria. The figure depicts how scoring is completed based on the patient's neurological behavior and status.

2 Purpose

The purpose of this project is to ascertain if either score can add to the nurse's ability to detect discrete episodes of acute deterioration at the bedside.

The questions to be answered by this quality improvement project include:

1. Do decreases of 2 more points in the FOUR Score and GCS occur prior to (2 hours or 4 hours) discrete deterioration events?
2. Can a coma scoring system assist in identifying acute deterioration in NeuroCritical Care patients?

3 Methods

Patient data was abstracted from the Sunrise Provider Order Entry and Clinical Documentation Systems for 200 patients with the diagnoses of intracerebral, intraventricular, subdural and subarachnoid hemorrhage. Fifty patients were excluded due to missing documentation or incorrect identifiers, therefore 150 patients were included in the analysis. 71 discrete events were abstracted from clinical documentation, consisting of any neurologic change, documentation of hypotension with treatment and episodes of endotracheal intubation. Other data elements collected include, age, gender, ethnicity, diagnosis, serial GCS, FOUR Score, motor exam scores, and pupillary assessment.

The quality improvement methodology that this project was based off of was the Six Sigma model.

- **Define:** Whether the FOUR Score or GCS is associated temporally with discrete episodes of deterioration in Neurocritical Care patients.
- **Measure:** Patients neurological exams will be completed using both the GCS and FOUR Score when assessing patients.
- **Analyze:** The scoring data from each neurological exam will be collected and analyzed, looking at patients behavior at the time each score was performed.
- **Improve:** The way we perform neurological exams and use the best method to predict patients behavior based on our results.
- **Control:** Determine the best methods or time frames to utilize in monitoring Neurocritical Care patients.



Figure 1: Four Score system.

<http://cmsimg.nurse.com/apps/pbcsi.dll/bilde?Site=cm&Date=20070410&Category=CRT&ArtNo=304100026&Ref=AR&AvisData=CM&MaxW=300&MaxH=450>

4 Analysis

Seventy-one discrete events were evaluated to determine if a decrease of 2 points or greater on the GCS and FOUR score occurred in 2 hour and 4 hour time intervals prior to the events. Due to variation in the timing of documentation, a change was not assessable in 96 out of 284 instances (33.8%). Of the remaining 188 assessment opportunities related to these physiologic events, a decrease in GCS of 2 points or greater preceded the events within 2 hours in 16% (8/50) of instances and 0 times within 4 hours. A decrease in FOUR score preceded an event within 2 hours in 14% (7/49) of cases and within 4 hours in 5% (2/43) of cases.

5 Conclusion

In this project we did not find that decreases in by 2 points or greater on either the GCS of FOUR score preceded episodes of acute deterioration. Variation in timing of documentation was a limitation as well as the fact that these 2 coma scales were developed as tools to trend neurologic status and coma states over time. Further work on tools and methods to detect events that directly and indirectly affect neurologic status may prove helpful in providing earlier interventions for critically patients with brain injury.

7 References

- Seidl, K. & Newhouse R. P., (2012). The intersection of evidence based practice with 5 quality improvement methodologies. *Journal of Nursing Administration*, 42, 299-304.
- Wijdicks, E., Bamlet, W. Maramattom, B., Manno, E. & McClelland, R. (2005). Validation of a New Coma Scale: The FOUR Score. *American Neurological Associations*, 58(4), 585-593.

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