Neurological Assessment: Practice Review'

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ABSTRACT

Background statement: Accurate completion of a Neurological Assessment including the Glasgow Coma Scale (GCS) is of the upmost importance in identifying and escalating neurological deterioration. This assessment must be standardised to ensure patient safety and quality care.

Aim: This paper aims to review the standardisation of the GCS inclusive of a comprehensive Neurological Assessment in metropolitan hospitals in Australia. Existing literature on this tool in clinical practice, will be further explored in this review. It will primarily focus on efficacy, standardisation and accuracy of completing a Neurological Assessment on an Adult.

Methods: A comprehensive review of the topic was undertaken, to reveal literature that supports the aim of this paper. Medline and Embase were accessed, with the use of Boolean operators to ensure literature met the inclusion and exclusion criteria.

Results: Five articles were selected as appropriate and relevant to meet the needs and expectations of this review. Research suggests inconsistency and validity of the tool, which may affect patient safety.

Key words: GCS, Glasgow Coma Scale, Neurological assessment, Education

Neurological Assessment: Practice Review

Introduction

Neurological Assessment including the Glasgow Coma Scale (GCS) indicates the neurological status, functioning and integrity of a patient's central nervous system (Derbyshire & Hill, 2018). In addition to the GCS, Neurological Assessment includes assessing the patient's pupillary response, limb power and vital signs. The GCS brings uniformity and consistency to assessing a patient's consciousness and provides clinicians with a common reporting language. The GCS remains gold standard internationally (Ehwarieme & Anarado, 2017; Reith et al., 2016). This paper is a review into the practice of clinicians completing a Neurological Assessment to ensure consistency and accuracy in completing these assessments, as well as to support a policy review from a Metropolitan healthcare organisation in Victoria. It was identified that the policy, in particular assessing components of the GCS, were outdated and not reflective of current best practice. This research will explore the common misconceptions of the GCS and the implications on patient safety. Furthermore, this paper will discuss the limitations and lack of standardisation regarding the Neurological Assessment, in addition to detailing a thorough clinical education approach to ensure consistency in technique and implications for future nursing practice. For this paper, the healthcare organisation has been de-identified, the policy reviewed is from a Metropolitan Hospital in Victoria, Australia.

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Purpose of Neurological Assessment

A Neurological Assessment is a collation of information indicating the functioning and neurological status of a patient's central nervous system. The assessment comprises the GCS, pupillary response, limb power and vital signs (Derbyshire & Hill, 2018; Hoban, 2017). The GCS was first developed in Glasgow in 1974 by neurosurgeons, Graham Teasdale and Brian Jennet, to bring uniformity to the clinical assessment of a patient's consciousness level (Derbyshire & Hill, 2018; Ehwarieme & Anarado, 2017; Hoban, 2017; Javvaji et al., 2022; Ozcelik & Celik, 2021). The Neurological Assessment scale offers a reliable and objective analysis of a patient's consciousness for both initial and serial assessments particularly in patients with impaired consciousness (Ehwarieme & Anarado, 2017; Hoban, 2017 Reith et al., 2016). The GCS tool was quickly adapted into clinical practice worldwide and is still considered to be gold standard (Derbyshire & Hill, 2018; Maserati, Fetzick & Puccio, 2016; Reith et al., 2016). The use of this scale enhances clear and consistent communication among healthcare professionals by promoting a common reporting language (Ehwarieme & Anarado, 2017; Reith et al., 2016).

The scale consists of three components, with each subsection given a score that is added together to provide an overall score between 3 and 15 (Derbyshire & Hill, 2018). Assessing each component requires observation of either spontaneous movement or after applying a stimulus (Reith et al., 2016). The first section, 'eye opening', is a measure of arousal. The second section 'verbal response' assesses higher cerebral functioning including awareness of time, place and person (Derbyshire & Hill, 2018). The third and final component of the GCS assesses 'motor response', this is the most significant component in predicting patient outcomes yet is the most difficult to accurately assess (Derbyshire & Hill, 2018). When assessing the patient's motor response, the assessment indicates the patient's ability to understand language and follow simple verbal commands reflecting the integrity of their motor cortex (Derbyshire & Hill, 2018). The patient's best response is documented, and only one limb needs to respond for a score of 5 or less (Derbyshire & Hill, 2018).

Neurological Assessment also involves assessing focal signs; pupillary response and limb power, as well as vital signs. Assessing limb power and movement indicates motor response and can determine the extent of neurological dysfunction (Derbyshire & Hill, 2018). Vital signs are the final component of completing neurological observations. Neurological dysfunction, deterioration and raised intracranial pressure will be reflected in the patient's vital signs (Derbyshire & Hill, 2018). Nurses play a critical role in provision of care to patients with neurological conditions and head trauma, including the assessment of consciousness, vital signs, monitoring for raised intracranial pressure and motor functioning (Derbyshire & Hill, 2018). Thus, it is of paramount importance that nurses have competent knowledge and skill to complete and document an accurate neurological assessment, as alterations in a patient's GCS score can be indicative of neurological deterioration prior to changes being observed in their pupillary response or vital signs (Ehwarieme & Anarado, 2017; Hoban, 2017).

Purpose of research

This research is focused on understanding the common misconceptions of the Neurological Assessment and the clinical impact on patient safety. The purpose of this review is to support clinicians in ensuring consistency and accuracy when performing a Neurological Assessment. As previously reported, the GCS was designed (Teasdale et al., 2014) to assess consciousness, and equally, promote reliability in reporting deterioration. Reith et al. (2016) and Derbyshire and Hill (2018) confirm the inaccuracies that can occur when completing this assessment; and without consistent user technique, reliability will be consequently affected (Reith et al., 2016). It has been reported that widespread dissemination of this assessment has detrimentally affected technique and therefore, contributes to variations in reliability (Reith et al., 2016). It is crucial to further understand the relationship on how clinicians can support users to ensure a consistent and accurate assessment to promote safe patient care.

Additionally, this review was conducted to further support a policy review and update at a Metropolitan Hospital in Victoria. It was identified that the information in this policy, particularly the components of the GCS, were not reflective of current evidence-based practice. A thorough review of the literature and consultation with colleagues at alternate organisations was conducted to ensure practice aligned. As reported by Portney (2020), it takes 17 years for evidence to be translated to practice. With the most recent update by Teasdale in (2017), it was paramount for this policy to be updated and for practice to be

altered to ensure consistent application of the GCS at this organisation, but equally, throughout multiple organisations nationally.

Method

Search strategy

Several electronic databases were accessed to further understand the research aim. This paper is primarily focused on a nursing perspective; therefore, it was crucial to include a peer reviewed database that includes high quality academic articles within this discipline. Medline and Emcare were selected as the most appropriate and relevant databases. A comprehensive search of the literature for this paper was conducted in July 2022 with the support of the hospital librarian to reveal high quality academic journals. Boolean operators were utilised to combine terms to complete the search. To ensure a comprehensive search, a filter was applied to limit articles in full text, English language and papers published from 2015-2022.

Inclusion/Exclusion

The search was frequently assessed to this criterion to ensure the search met the aim of the paper. Research that met the criteria includes papers that primarily focused on human studies and an adult population. Studies that focused on a paediatric population or animal studies were excluded from the findings, as this did not meet the expectations and aim of this review.

Findings

A data extraction tool, Covidence, was utilised to ensure a thorough review of the collated literature. A total of 63 articles were uploaded to this data base for review, each article was individually assessed by two people to produce an accurate representation of the aim. Titles and abstracts of each paper were closely examined to determine the relevance of the literature. The support of the data extraction tool, and a thorough review of each paper, revealed five articles that appropriately reflected the aim and were selected to be included in this paper.

Study design

This paper analysed 63 articles related to the application of a Neurological Assessment including the GCS As previously discussed, a total of five papers were included in this comprehensive review. The methodologies used in this paper were qualitative and provides a relevant collation of academic journals to reflect the purpose of this review. The literature featured in this article includes primary research due to the lack of secondary pre-appraised research that met the inclusion and exclusion criteria.

Discussion

Limitations of Neurological Observations

In recent literature there has been several limitations and criticism detailed of the use of the GCS. Common criticism is that components of the scale can become untestable for several reasons. Potential factors influencing the score of the ‘eye opening’ component but not necessarily indicating a lack of arousal include deafness or occipital swelling (Derbyshire & Hill, 2018).

The GCS has particularly been reported to have low reliability when completing an assessment of the verbal component (Ozcelik & Celik, 2021). This component is most impacted by intubation, tracheostomy, locked in syndrome, dysphasia and sedation but these factors don’t necessarily indicate the patient has a lack of awareness (Derbyshire & Hill, 2018; Ozcelik & Celik, 2021; Reith et al., 2016). Recent studies undertaken by Javvaji et al. (2022) and Ozcelik and Celik (2021) compare the GCS to the FOUR score in neurologically impaired patients. Javvaji et al. (2022) reported that both scores have ability to predict mortality and morbidity in both stroke and non-stroke cases. A limitation of this study was the small sample size, thus further studies are required. Given the limitations of applying the GCS to intubated patients the FOUR score potentially serves as an appropriate alternative if staff are competent in using the score, as it is not widely used or known by all healthcare professionals (Ozcelik & Celik, 2021).

Lastly, the ‘motor response’ can be influenced by administration of sedatives and muscle relaxant medications. Additionally, when assessing the patient’s ‘motor response’ normal flexion can be commonly mistaken as a flexor response resulting in an incorrect GCS score (Derbyshire & Hill, 2018; Javvaji et al., 2022). Furthermore, brainstem reflexes are not assessed in the GCS, which has been identified as being significantly associated with mortality (Javvaji et al., 2022). These factors can undermine the effectiveness of the GCS scoring system.

However recently Teasdale and colleagues provided clarity in approaching “missing com-

ponents", reporting that whenever a component is 'not testable', the assessor should document the reason and write 'NT' rather than assigning a score of one to reflect a more accurate result (Reith et al. 2016). Examination of the eye and pupillary response is an important aspect of neurological observations. Factors influencing abnormal pupil shape, size and reactivity include prior eye surgery, medications and hormonal disorders; in the absence of raised intracranial pressure. Therefore, it is essential to observe the pupils prior to applying a light stimulus (Derbyshire & Hill, 2018).

Lack of Standardisation

It has been identified there is a lack of standardisation regarding technique and application of the GCS, reporting, as well as inconsistent use of the 15 point scale (Reith et al., 2016). A study by Reith et al. (2016) found 25% of practitioners never use a peripheral stimulus, and it has been suggested that different stimulation techniques elicit different responses. This study explores reliability of the GCS being influenced by teaching and clinical experience. Insufficient teaching and a lack of clinical experience can contribute to the variation in neurological assessments. Reith et al. (2016) has shown that reliability of assessment is lower in untrained and inexperienced staff, and findings confirm a lack of standardisation in use. It is acknowledged that the results of the paper-based questionnaires mainly reflect European experiences. To reduce variability in neurological assessments among nursing staff, if neurological deterioration is suspected in patients, a second competent nurse should repeat neurological observations to confirm deterioration (Hoban, 2017).

Education and Training

Policy to Practice

It is evident within the literature, and in clinical practice, that the GCS is not always the preferred method of assessment that meets the needs of all patients (Maserati et al. 2016). Patients who are of a culturally linguistically diverse background attracts further scrutiny of the tool. Braine and Cook (2016) recommend addressing and acknowledging this group when completing an assessment. These challenges are consistent within the clinical setting, from observation within the role of a clinical educator working in the Neuroscience speciality. A selection of patients who were dysphasic, did not speak English, or hearing impaired were observed in clinical practice to be scored as 'Confused' or 'None' in '**B**est verbal response'. This response was not considered as appropriate or demonstrate clinical reasoning. Therefore, and reflected in clinical practice, staff did not have the appropriate knowledge to confidently and accurately assess a patients' neurological status. A paper written by Reith et al. (2016) and Braine and Cook (2016) confirms frequent variation and confusion in aspects of '**B**est motor response' when assessing response to painful stimuli. Anecdotally, in discussion with clinicians, it is reported that inflicting pain to patients, and common confusion on what site is preferred, is a barrier to performing this section correctly. The challenges faced by clinicians specialising in Neurosciences is further supported by Heron et al. (2001) in that only 35% of nurses correctly assessed 'Best motor response'.

The literature, and observed practice, demonstrates a change to clinical practice was required and as a result a thorough review of the literature, in conjunction with collaborating with tertiary hospitals was undertaken. Javvaji et al. (2022) reveals the importance of an education approach that follows a clear, standardised method of learning. Visiers-Jimenez et al. (2020) states that fostering a positive learning environment allows for clinicians to feel competent and confident in performing skills. Equally, it is imperative to ensure standardisation of teaching and learning; this can be achieved with the appropriate governing documents. Collaboration with a select, few, hospitals in Australia was undertaken and four out of seven hospitals did not have a 'Neurological Assessment' policy available. Hole (2020) states the importance of policies and procedures, and support how clinical governance supports nurses to engage in evidence-based practice and therefore enhances the capability of clinicians.

To ensure a consistent and standardised approach, stakeholders were notified for their expert, speciality knowledge to appraise the revised policy. This group included senior nurses working in the clinical ward area, Nurse Unit Managers and medical colleagues within in the Neuroscience division. The Clinical Education team worked to ensure all learning modules were reviewed to meet the need of the new policy, and staff were informed of the key changes by frequent education sessions within the organisation. There were several changes made to our processes, including revised terminology and a thorough review of confounding factors that would impact the GCS score and assess-

ment. The alterations in the policy were adequately supported by the target group and clinicians have found the information to be consistent, and supportive of patient care. It is recommended that nurses in speciality areas regularly review the literature to ensure that patients receive high quality evidence-based care.

Education

Neurological Assessment is utilised throughout the world, as a reliable tool to assess consciousness and neurological deterioration (Javvaji et al. 2022). Health professionals rely on this assessment tool in the clinical setting, to identify trends of deterioration and to evaluate health interventions (Ehwarieme & Anarado 2016). It is imperative that staff using this tool are confident and competent to prevent inaccuracies in assessment (Derbyshire & Hill, 2018). A study performed by Ehwarieme and Anarado (2017) revealed that 76% of staff have not used, or have any confidence in using, the GCS. The results from this study support current clinical practice amongst clinicians in a neuroscience ward at a metropolitan Hospital in Melbourne. It was critical that educators at this site acknowledged current gaps in practice and translation to clinical care. Performing this assessment is commonly undertaken by nurses, doctors and allied health professionals. Thus, education was primarily targeted to this audience (Ehwarieme & Anarado 2016). Frequent observation and feedback from senior clinicians revealed that junior nursing staff required further support to feel confident in performing a neurological assessment. An education and training restructure was conducted, with support of the research, to ensure staff felt competent to assess patients. As discussed, a comprehensive review and update of the organisation policy was undertaken which supports staff to independently provide quality patient care without senior colleagues in attendance. A dynamic, and interactive, e-learning module was developed prior to this review, which aims to support theoretical knowledge and measures competence through the form of a quiz. Additionally, staff will receive a one-hour workshop on the fundamentals of the neurological assessment; this is measured through a practical assessment at the bedside where staff are observed, and given feedback on their practice, in real time. This session is designed to support learners with alternate learning styles to ensure learning outcomes are met (Zarandona et al. 2019). Frequent competency assessments are supported and encouraged to ensure a standardised approach to Neurological Assessment (Maserati et al. 2016). Additional methods used to promote confidence and competence, is encouraging staff to resource senior clinicians when unsure, or to have a second staff member perform the assessment to confirm a potential deterioration (Hoban 2017).

Implications for Nursing Practice

Reliability

The GCS has been identified as a highly valid tool in predicting outcome in neurological conditions such as acute stroke or subarachnoid haemorrhage, as well as having good interobserver reliability (Ehwarieme & Anarado, 2017; Javvaji et al., 2022). However, Reith et al. (2016) express concerns that with time, the widespread use of the scale has been accompanied by variation in technique and consequently variation in reliability of its use. In a questionnaire-based study by Reith et al. (2016) 78% of participants reported using a standardised approach for applying a stimulus, 62% of participants assessed both arms and legs in completing the GCS and 37% assessed the GCS by the arms only, reflecting significant variation in application of a painful stimulus (Reith et al., 2016). A survey undertaken by Maserati, Fetzick and Puccio (2016) discusses how reliability and accuracy of assessment, varies between clinicians from different specialities and level of clinical experience. Thus, the need for thorough education and assessment of clinicians completing neurological assessment. Reliability of the neurological assessment is critically important, as discrepancies or inaccuracies in the assessment could result in miscommunication and suboptimal care. Studies reviewing the reliability of the scale have been undertaken since the introduction of the GCS with variable results. Previous studies report consistent application of the GCS is key to reliability of the GCS assessment (Reith et al., 2016).

Recommendations for practice

Clinicians frequently performing Neurological Assessment should be regularly reviewing evidence-based practice to ensure high quality care. Further research is required to examine the longitudinal impact of implemented education strategies to reveal the confidence of nurses performing Neurological Assessment. Education strategies such as a practical workshop, implementation of an e-learning module and practical assessment in the clinical setting has proven to be effective in consistent assessment (Maserati, Fetzick

& Puccio, 2016). It is additionally encouraged for staff to provide regular feedback to their colleagues; peer feedback is utilised to promote growth, strengthen workplace culture and to improve patient care (Rocco et al. 2020). To effectively ensure a positive learning environment, it is recommended to alter teaching methods to meet all learning styles. This is reflected in Campos et al. (2020) research, that reiterates the importance to utilise various learning styles to support learners nursing practice.

Conclusion

Accurate completion of a Neurological Assessment is of the upmost importance in identifying and escalating neurological deterioration. Thus, it is crucial nurses are competent and have thorough knowledge of how to accurately assess each component of the Neurological Assessment including the GCS. The GCS is considered gold standard in clinical practice for assessing consciousness, no other scale that assesses consciousness is as extensively used or globally recognised. However, the GCS has received criticism regarding its reliability and lack of standardisation. Subsequently, there is a need for continued efforts regarding improving the global standardisation of completing a GCS and ensuring thorough education of this assessment to all clinicians. This review of practice has highlighted the importance of education and competency assessments of clinicians' practice. It is of paramount importance that clinical practice and assessments are routinely reviewed to ensure care remains evidence based. Reflection of clinical practice and local policies proves invaluable to the quality of patient care and ultimately patient outcomes.

Nursing implications

The role of the Neuroscience Nurse in ensuring appropriate and relevant training methodologies to accurately assess Neurological Assessment is crucial. Future studies measuring the evaluation of revised education resources and training would prove vital to a standardised approach to Neurological Assessment.

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