The Accuracy of Glasgow Coma Scale Knowledge and Performance among Vietnamese Nurses

by

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Abstract

The Glasgow Coma Scale (GCS) is used as a tool to assess the level of consciousness in a brain injury patient. In this study, special attention was given to investigate the accuracy of Glasgow Coma Scale (GCS) knowledge and performance among Vietnamese nurses. On the basis of a nurse sample in CR hospital, a cross-sectional descriptive study was performed. The designed questionnaire was used to identify the accuracy of the nurses' knowledge of the GCS and the accuracy of the nurses' GCS score of each patient. By taking into account the relationship of the variables, a series of analyses were conducted by *t* test, chi-square test, and ANOVA. The results indicated that most of the nurses (>90%) answered correctly with respect to GCS basic knowledge; however, 52.1% of the nurses made errors in the clinical scenario section. In the performance section, high accuracy was shown on the motor and verbal subscale (77.9% and 74.5%). Moderate accuracy was shown for eye score (67.4%). All three components revealed a low accuracy percentage (42.1%). Consequently, it was found that nurses made significant errors in their performance of the GCS even though they showed a high level of theoretical knowledge. Moreover, the significant difference in knowledge between the performance groups was subsequently explored to emphasize the importance of GCS education

Chapter 1. Introduction

Traumatic brain injuries (TBIs) are a leading cause of morbidity, mortality, disability, and socioeconomic losses in many developing countries. The incidence varies from 67 to 317 per 100,000, and mortality rates are near 1% for minor injury, 18% for mild injury, and 48% for severe head injury (Basso, Ignacio, Duarte & Ferrari, 2001; Gururaj, 2002). Especially, in Vietnam, "the damage caused by traffic accidents stands just behind that caused by the war," said Colonel Tran Dao Levine (1997, p.199). Traffic accidents in Vietnam, mainly related traumatic head injury, have accounted for 30,000 deaths and 94,000 injuries.

Consciousness level assessment is considered as a primary action practiced by a variety of health care professionals, including nurses, physicians, and paramedics, and in many care-units, especially those units treating severe or brain injury patients. Neurological assessments provide useful information to prognosticate whether the patient's condition is improving or worsening. The assessment not only presents the neurological problem but also detects the initial symptoms of complications. It can be an indicator of intervention or treatment in emergency conditions (Weir, Bradford & Lees, 2002). In addition, health care professionals can use it to predict long term impairment, patient outcome, or even survival of the initial head injury when patients are admitted to the emergency room or intensive care unit, pre or post-operation, and during the period of hospitalization. Before the implementation of a consciousness evaluation scale, it was difficult to define the "severity" of a brain injury, and few treatment options could be offered coma patients after trauma (Rush, 1997).

GCS KNOWLEDGE AND PERFORMANCE IN VIETNAMESE NURSES

The Glasgow Coma Scale (GCS), first presented by Teasdale and Jennet in 1974, is one of the most effective and reliable tools to assess the "depth and duration" of impaired consciousness and has been widely used in most hospitals all over the world. The high level of validity and reliability of the GCS ensure its assessment accuracy in comparison with other earlier scoring systems such as the anatomical or physiological scoring system and the revised trauma score (Fisher & Mathieson, 2001; Kingston & O'Flanaga, 1997). None of the alternative methods, including the recently published Alert, Confused, Drowsy, Unresponsive (ACDU) scale and the Alert, Response to Voice, Response to Pain, Unresponsive (AVPU) scale, have been shown to equal the capacity for reliable and practical use (McNarry & Golhill, 2004). Many studies have been conducted to confirm the usefulness, reliability, and practicality of the GCS to obtain consciousness data (Juarez & M. Lyons, 1995; Rowley & Fielding, 1990).

The GCS is "a quick, practical standardized system for assessing the degree of consciousness, primarily in patients with head injuries," as defined by Mosby's Medical Dictionary (2009). It includes three factors: amount of eye opening, verbal responsiveness, and motor responsiveness. Every component has subcategories; the minimum score is 3 and the maximum score is 15. When reporting GCS results, it is believed that the individual component scores are important as well as the total score. The original scale included a maximum score of 14 and was designed for the sole purpose of predicting the patient's condition. However, after that, it gained universal acceptance in many medical field more quickly than the GCS's author could imagine (Rush, 1997). The GCS became a global standard because it could enhance communication among practitioners through a common

reporting language, despite its simple appearance. Health care provider believed that it is an effective and low cost neurological tool to prevent and monitor brain damage after a trauma. Because of its validity, reliability, and practical utility, the GCS has been the gold standard for the neurologic assessment of trauma patients. It was developed to be utilized as a research tool to evaluate all types of consciousnesses. Moreover, on the basis of GCS score, health care providers can make a clinical decision regarding surgical intervention or drug modalities to manage their patient. GCS uses the numeric system so it minimizes variation and subjectivity in clinical assessment (Lacono & Lyons, 2005; Norwood, McAuley, Berne, Creath & McLarty, 2002; Shah, 1999).

Because of the apparent simplicity of the table, a large number of health care professionals have used it in an inappropriate method without carefully referring to the GCS instruction. Other authors (Bazarian, Eirich, & Salhanick, 2003; Brunker, 2006; Iankova, 2006; Zuercher, Ummenhofer, Baltussen & Walder, 2006) have reported incidents in which the GCS has been inaccurately and ineffectively used by different medical staff in clinical practice.

According to Edward (2000), there was a gap between the literature and practice in the use of the GCS. Neurological observation must include assessment methods to determine whether patients are deteriorating or not. However, few nurses appreciate the neurological mechanism underpinning the assessment and causing the patient's status changes. Holgate, Ching & Angonese (2006) determined that the important key factors that most affect accuracy are the unstable condition of the patient, inadequate knowledge of the GCS, and the experience of doctors and nurses. There are several studies in medical nursing journals that

focus on the inter-rater reliability of the GCS in critical care to examine the accuracy in practice. Heron, Davie, Gillies & Courtey (2001) used a video recording to compare GCS scoring between nurses and the standard. The results indicated that those registered nurses who received a specific qualification from critical care training would perform accurately. These potential problems sharply affect patient safety and the process to improve patients' outcomes.

However, we still have few available studies to examine the appropriate knowledge of the GCS among nurses and the accuracy of performance in nurses at different professional levels such as experienced nurses, new RNs, and the nurses who work in others units but still use the GCS frequently. An educational intervention model on GCS awareness and a formal policy assessment to nursing staff will strongly influence GCS accuracy in everyday practice.

Almost all hospitals in Vietnam that have emergency units, intensive care units, or neurological-neurosurgical departments also use the GCS to assess their patients' consciousness level. However, the GCS is not taught in school officially as an important topic and is often just mentioned briefly. Similarly, in the clinical setting, most new nurses receive information on how to use this scale by experience transfer, but they are not careful trained. Overall, medical staff is not provided with enough GCS background information to accurately perform GCS scoring. Vietnam currently does not have any data or research to identify the accuracy of GCS scoring performed by health care professionals. This study will make a significant contribution by exploring the accuracy of GCS usage in Vietnamese nurses. Thereafter, it could stimulate a comprehensive education program both in schools and hospitals so that nurses have sufficient knowledge to provide a high quality of care.

Chapter 2. Purpose of Research

The purpose of the study is to determine the accuracy of GCS knowledge and performance among Vietnamese nurses.

2.1 Specific Aims

The specific study aims are as follows:

1. To identify the accuracy of knowledge regarding the GCS;
2. To identify the accuracy of performance regarding GCS scoring;
3. To examine the difference in knowledge regarding the GCS between groups with incorrect and correct performance; and
4. To examine the difference in knowledge and performance of GCS scoring by general characteristics.

2.2 Definition of Terms

2.2.1 Knowledge of GCS

Conceptual definition: Knowledge is defined as awareness of the meaning of the modes of behavior exhibited by a patient in response to stimuli in order to determine the degree of consciousness (Mosby's Medical Dictionary, 2009).

Operational definition: Knowledge of the GCS was examined by using the questionnaire developed by Hiem, Schoettker, Gilliaerd & Spahn (2009) and included six questions.

2.2.2 Performance of GCS

Conceptual definition: GCS performance was defined as the patient brain damage

assessment made by the nurse by using three components: amount of eye opening (maximum of four), verbal responsiveness (maximum of five), and motor responsiveness (maximum of six). The lowest score for each component was one. The lower score indicated a lower level of consciousness (Mosby's Medical Dictionary, 2009).

Operational definition: The form of the GCS was used to record the nurses' performance results. The score of each component and the total score were compared with the researcher's results in order to classify the nurses into the correct and incorrect groups.

Chapter 3. Literature Review

3.1 The History and Development of the GCS

In the 1950s, neurosurgeons were afraid to treat head injuries because it was so difficult to identify the condition of the patient. It was considered "untidy" in outcome. An initial mild injury might become much more complicated and even life threatening, and medical staff could only perform a few treatments especially for patients in a coma. They did not know how to identify the severity of brain trauma and its dysfunction. On the other hand, medical professionals also faced challenges related to the psychological terms that were used to exchange information between health care providers. At first, they tried to list the neurosurgical, neurological, and physiological terms to define the variety of coma levels. However, their definition was not easy to apply in practice, and there was no evidence that the generalizations were easy to understand (Jennet, 2002). Therefore, Dr. Fred Plum ran studies of the medical prognosis of comas, and the researchers realized that they must have a tool to measure the level of consciousness.

The GCS was published in 1974 by Teasdale and Jennet after many studies were conducted in the Netherlands and US. Nurses who worked in the intensive care unit first used it to evaluate the depth and duration of a coma (Rush 1997). Thereafter, it became an international scale as even those who did not speak English as their first language could use it. In the early use of the GSC, the total score was only 14, as it did not yet contain a question related to lack of abnormal flexion to pain. In 1976, in the motor response component, abnormal withdrawal from painful stimulus was added, and the final table included a maximum score of 15 (Matis & Birbilis, 2008). The GCS operational definition was made

available to instruct health care staff how to accurately perform the GCS. According to the Inland Counties Emergency Medical Agency (1998), eye opening is the first component of the GCS and has four levels of response. Spontaneous (4 points) means that the patient's eyes are open at the time of the assessment without any stimulation, and the patient can close or open his eyes upon command. This reflex is termed functioning arousal. Next (3 points) is the response to voice; this means that the eyes open when the patient's name is spoken or shouted. If this step is unsuccessful, standard pain stimulus will be applied to generate a response to pain (2 points). The lowest level is no response. The verbal component is normally performed next; it includes five levels of responses. The patient is supposed to be oriented (5 points) if he can answer some specific questions from the observer. In the case where the patient is unable to give an accurate response, but can produce phrases, sentences, or conversation, it means he is in a confused condition. Score is 4. In the appropriate level(score of 3), they can only produce an intact word or two, which might only come from physical stimuli or a relative's name. Sometimes, the patient just groans and moans or makes unintelligible mumblings. The given score is 2. The final level is no response. The third component is motor response. The highest level (six points) is recorded if the patient can obey the request from the observer. Five points are recorded if the patient can move his limbs or body away the painful stimulus in a purposeful manner. The definition of withdrawal is elbow flexes, no muscle stiffness, and rapid movement of the arms drawn away from the trunk with painful stimulus (4 points). The following are the steps for the assessment of flexion and extension. Flexion of arms, the forearms and hands are held against the body that is 3 points. The opposite position (2 points) is extension with arms and

legs extended, muscle stiffness, and external rotation of shoulders and forearms. No response from the stimulus is given a score of one.

3.2 The Application of the GCS

The GCS was first intended as a research tool to determine a prognosis for a patient. However, it soon became a part of everyday practice and was not only adopted by nurses and physicians in neurosurgery units but also by health professionals caring for head injuries or brain trauma problems. Nurses first volunteered to record information by GCS to measure their patients' levels of consciousness at the bedside. They realized that it provided useful data so that nurses could have a visual display after check up; in addition, the patients' state was much clearer than before, and it helped them make the right decisions with regard to their responsibilities. Thereafter, the GCS was introduced as a training program in nursing school, and it became popular when nurses used it in usual practice. From that point of time, the majority of health care providers welcomed the GCS when it was combined with the vital sign chart in neurological observation (Jennet, 2002). The final step of the adoption GCS as an assessment tool took place when a committee of the official associations of neurosurgeons agreed to accept the scale, and an American neurosurgeon published editorial to confirm the adoption throughout the world. During this remarkable stage of development, the GCS was translated into many languages, and its use became widespread all over the world.

The GCS was considered as a standardized approach to objective and accurate assessment; for this reason, its application soon expanded beyond the confines of the neurological ward into others settings such as the emergency department, intensive care unit, post surgery unit, and recovery room. It gained wide spread acceptance as a useful, reliable,

and valid tool when professional organizations used it as part of brain injury monitoring and as a predictor of long term ability after treatment completion and discharge from the hospital. Furthermore, it was utilized by pre-hospital staff to make airway management or disposition decisions (Crossman, Bankes, Bhan & Crockard, 1998; Bazarian et al., 2003; Heron et al., 2001; Iankova, 2006). They believed that the GCS was a well-recognized predictive tool that achieved a high validity and good sensitivity to changes in most of levels of consciousness (Fisher & Mathieson, 2001; Holgate et al, 2006). The GCS became the most familiar neurological assessment tool worldwide due to its consistent and convenient numerical characteristics. Nurses could make an independent assessment and display it in the chart.

According to Matis & Birbilis (2008), 4,500 publications have made reference to the GCS and reported the incorporation of the GCS into various traumas scoring systems. Its fundamental knowledge was used to build other scales to assess the condition of patients, such as the Revised Trauma Score, Acute Physiology Age, and Chronic Health Evaluation. Maureen (1996) stated that the validity and reliability of GCS was substantiated through many researches. The precision of the GCS permitted it to be applied both in decision making to classify patients in triage and to classify valid data in retrospective medical studies (Kingston et al., 1996). It is routinely used evaluate other studies and trials (Hiem, Schoettker, Gilliard & Spahn, 2004). In a survey about the full application of the GCS in the medical field, Matis and his co-worker summarized its use in these major areas: to classify the level of head trauma in adults and children; to determine a diagnosis; to evaluate the effect of hemorrhage in a patient; to treat patients in the surgical and intensive care ward; to treat acute stroke and aneurisms; to examine meningitis and central nervous system

infections; to treat carotid artery injury; to evaluate the risk of pneumonia from aspiration; and to measure quality of care.

In addition, studies have found that GCS guidance should be developed to gain high accuracy and inter-rater reliability in using it (Marion & Calier, 1994).

3.3 Clinical Usage of the GCS

After this practical scale was published, many researchers began their own investigation of its reliability due to some errors that had previously been reported. Graham Teasdale, the author of the GCS, and his colleague ran an observation study to explore which factors mainly affected the reliability of the GCS. It included three major stages. First, they determined the terms that were mostly used in the assessment and the components of scale. In the second step, each component of the scale was examined in more detail. Finally, in the third part, the inter-rater reliability of the scale was checked by using a specially prepared film. Although the GCS was considered as a national standard scale, confusion related to the terms applied to the patient or the specific scoring in the absence of a normal response still existed. Moreover, disagreement about verbal responses occurred, and disagreement between normal and abnormal flexion was strong. They also realized that there were various techniques to generate painful stimulus to score the GCS or to interpret the same response from the patient. The difference happened among doctors in every head trauma center and different groups of languages. Researchers thought that providing more detailed definitions and information to medical staff could resolve this issue. After that, many authors added more detailed information to guide accurate GCS assessment (Edward, 2000; Jennet, 2002; Waterhouse, 2005). In another prospective study conducted by Heron et al. (2001), the inter-

rater validity of GCS scoring among nurses was measured by using seven video recordings as a useful validity tool. It was a non-randomized trial implemented with a non-probability convenience sample of 75 registered nurses who worked in sub-specialties critical care. As a consequence, the inter-rater reliability for verbal response still showed a high level of reliability in comparison with motor response. Motor assessment was mentioned as the most difficult step with respect to scores in the middle range. Therefore, the methods for improving this condition must be investigated in order to build a suitable education program. On the other hand, in a study published in 2006, Holgate and her colleague measured the agreement between senior doctors and nurses in an emergency department. To determine the inter-rater reliability, the nurse and the physician rated the GCS score of the same patient. They found excellent agreement on the total score in the two groups they surveyed. Nurses and senior medical staff also had great inter-rater reliability on the verbal component. However, in the eye and motor component, they only could gain moderate agreement on the basis of the Kappa statistic. In general, they found no significant difference in agreement across the range of GCS scores. This finding demonstrated that the difference is potentially dangerous for patients.

The use of the GCS in brain injury assessment was synthesized and analyzed by Zuercher et al. (2009) in their critical review. They summarized that more than one third of health care providers provide inaccurate GCS scoring. The accuracy varied depending on the type of health care provider, their experience level, educational level, and the sources of training that they received. The investigation only demonstrated a moderate or poor level of agreement in experienced and inexperienced nurses and between physicians. The variability

in GCS scoring might lead to misleading and unnecessary referral interventions and affect patient safety. They also pointed out that the factors that contribute to inappropriate GCS scoring were mostly related to the definition of GCS, the time and frequency of assessment, the patient's medication, and the reporting of GCS score. In conclusion, an improvement-training program was mentioned to provide the best care and treatment for patients.

Many prior research findings showed the need to reinforce the accuracy of GCS scoring to increase its efficiency. However, the reasons behind the inaccuracy or imprecision had to be explored in advance. In the JBI Systematic Review Protocol, Mattar, Fai, CStat & Ying (2009) listed many investigations that determine some major factors related to inaccuracy in clinical practice. First, they quote the research of Shoqirat (2006) of which the subjects were third-year students. In the final findings, Shoqirat reported that the difference in education directly influenced the ability to carry out GCS scoring. Students who practiced in a neurological setting performed better than those who worked in other wards. In contrast, result demonstrated that significant experience did not mean better practice; Shoqirat really wanted to impress the role of training to minimize errors. In addition, Waterhouse and Edwards used a similar approach to determine the best method of improving GCS observation. They examined fundamental knowledge as it related to GCS assessment and analyzed the current practice. Determining which performance was correct and which action was correct caused misunderstanding and false results. Both authors were concerned with others factors such as vital signs, and they believed vital signs should be recorded along with GCS scoring to ensure observers made an accurate assessment. According to Waterhouse, depth knowledge in relevant physiology enhanced GCS

performance. Moreover, both opined that continuing education is required to keep staff updated on information and maintain reliability.

In summary, the GCS is considered as the most reliable tool to assess consciousness levels and has been widely used worldwide since it first appeared. However, because the knowledge of medical staff is not sufficient due to the lack of education, a great deal of misunderstanding and confusion still exists. In particular, the various assessment methods lead to inaccurate performance in clinical settings.

Chapter 4. Methods

4.1 Study Design

This is a cross-sectional descriptive correlation study.

4.2 Sample

The study was conducted at the neurology ward, neurosurgical department, and neurosurgery intensive care unit NCU in the CR Hospital located in Ho Chi Minh City, Vietnam. The target population was nurses who use GCS to assess the level of consciousness of patients in the hospital. The accessible population was nurses who work in the neurosurgical department, neurosurgery intensive care unit, head injury department, and neurology department. Because most of the nurses who work in clinical settings in Vietnam graduate from two-year nursing programs, the inclusion criteria for participants of this study were (1) nurses working in the hospital who graduated from a two-year or longer training program, (2) nurses volunteering to participate in this study, and (3) nurses caring for adult patients who suffer from head injury, neurological pathology, and are eligible for assessment. The exclusion criteria were nurses who graduated from a one-year educational program or assistant physicians with three months of nursing education and nurses with less than one year of working experience.

The convenience sampling method was used to recruit the study's participants. Finally, 94 nurses who satisfied all inclusion criteria and agreed to complete the questionnaire and performance segment of the study were recruited.

4.3 Instruments

4.3.1 Questionnaire on GCS Knowledge

The questionnaire used to evaluate the knowledge of nurses regarding the GCS was designed by Heim et al. (2009). Permission to use the questionnaire was obtained via e-mail.

The questionnaire was derived from the study of Catherine Heim and her co-worker about air rescuers' knowledge of GCS scoring. A pilot study also was conducted to test the accuracy and validity of the questionnaire when it was translated from English to Vietnamese: the researcher translated the questionnaire into the Vietnamese language and then two nursing lecturers who were also studying English in a master's level nursing course were asked to translate it back into English. After that, the original questions and the translated versions were compared, and the experts reached an agreement on the same meaning in the English and Vietnamese versions. Next, to verify the accuracy of the questionnaire, five experienced nurses who worked in neurosurgery received the questionnaire and answered all the included content of the questionnaire. Then, the researcher collected the results and opinions of the nurses. All of the nurses could complete the questionnaire without any explanation.

The questionnaire measured GCS knowledge and included six questions. The first five questions tested general GCS knowledge, including identification of its name, structure, and individual components. The last question described a clinical scenario for the application of theoretical knowledge and required the nurse to provide the total score and the score for each component of the GCS. The responses were scored as "1" for a right answer and "0" for a wrong answer to each question. The higher scores indicated a higher knowledge of the GCS. The reliability coefficient, KR-20, for the Vietnamese version in this study was 0.60.

4.3.2 GCS Performance Form

The form included the total GCS score and the score of each component provided by the nurse and the researcher. The form was also used to differentiate the correct group and incorrect group with respect to GCS performance.

4.3.3 Nurse's General Information

The general information collected included the age, gender, marital status, religion, working experience, educational background, history of GCS education, level of confidence on GCS scoring, and the level of importance of using GCS, which was assumed to influence the nurses' GCS knowledge and performance.

4.4 Data Collection

The GCS score given by the researcher was used as a norm to compare with those of the participants. Reliability was assured by training in the Ajou Hospital with an advanced practiced nurse who is a specialist with vast experience in the neurosurgery area and also the head nurse in the neurosurgery intensive care unit. The researcher worked with the nurse for two hours per day over five days. The training focused on GCS scoring. Researcher and specialist nurse devoted 30 minutes every day to review the related documents and then reached agreements regarding the GCS scoring of six to seven patients. They achieved high agreement in 30 cases. The same process was implemented with an experienced neurosurgery physician in CR hospital, and they achieved high agreement in GCS assessment as well.

Nurses who agreed to participate completed the general information. Then, the nurses had to answer all of the questions in the questionnaire sheet independently in a limited amount of time (15 minutes) under the observation of the researcher. The completed

questionnaire was collected immediately. The participant was not informed of the results to ensure the objectivity of other participants until the data collection was completed. Nurses who participated in study independently performed GCS scoring of a patient assigned by the researcher and under his observation; thereafter, the researcher also evaluated the GCS score of the same patient at almost the same time. After that, the GCS score provided by nurses was collected and compared with the researcher's score. The results from questionnaire and the performance were returned to the researcher and checked. A completed document was analyzed.

4.5 Data Analysis

Data collected were analyzed using SPSS Win Version 17.0. Descriptive statistics were used to demonstrate the nurses' general characteristics, the accuracy of their knowledge, and their GCS scoring performance. The *t* test was used to examine the difference in knowledge between the correct performance group and the incorrect performance group. Then, ANOVA and the x^2 test were used to measure the difference in knowledge and performance by the nurses' general characteristics. The comparisons of group means when significant differences occurred were conducted by using post hoc analysis with the Least Significant Difference (LSD) test.

4.6 Ethical Considerations

The data collection process was implemented from July 5, 2010 to August 13, 2010. The researcher sent a proposal plan and obtained permission from CR hospital to collect the data during this time in the five departments. The nurses received an informed consent form, and those who agreed to participate in this study were required to sign the form.

Chapter 5. Results

5.1 Participant's General Characteristics

A total of 98 nurses agreed to participate in this study, but four nurses did not satisfy the inclusion criteria and did not complete the general information and questionnaire. All of the other nurses completed the three sections of study without any missing data.

General characteristics were collected with regard to the department in which they worked, their age, gender, working experience, educational background, religion, marital status, source of GCS training, how confident they felt in GCS scoring, and their attitude regarding its importance.

Because this study used a convenience sample, the number of nurses recruited depended upon the number of nurses in those units that agreed to participate through an informed consent form. The majority of the participants worked in the NCU department (30.9%), and six nurses (6.4%) in the neurology department participated in the study. Female nurses in this study outnumbered (88.3%) the male nurses. The age of the nurses ranged from 20 to 51 years; nearly half of the nurses (42.6%) were in the 26–30 years range, and over half (64.9%) were less than 30 years old. Similarly, many nurses had less than two years of working experience (35.1%), and 34% had an average experience from three to seven years. In general, they did not have much experience practicing in clinical settings. Moreover, the majority of nurses graduated from a two-year nursing program (91.5%), and the minority completed a three- or four-year program. This is common in almost all hospitals in Vietnam. In response to where they received their GCS training, school was the highest percentage (67.0%). However, a large number cited that they only received information from the

hospital. When they were asked about how confident they felt in GCS scoring, most of them felt very confident in comparison to a little confident, 83% and 17% respectively. Surprisingly, all of them believed that GCS assessment was very important in treatment and patient care. They all knew the validity of the GCS very well.

Table 1

Participant's General Characteristics (N = 94)

Variables	Category	Number	%
Department	Neurosurgery-3B1	19	20.2
	Neurosurgery-3B3	23	24.5
	Head injury	17	18.1
	NCU	29	30.9
	Neurology	6	6.4
Gender	Male	11	11.7
	Female	83	88.3
Age	20–25	21	22.3
	26–30	40	42.6
	>31	33	35.1
Working experience (year)	1–2	33	35.1
	3–7	32	34.0
	>7	29	30.9
Educational background	2-year program	86	91.5
	3-year program	5	5.3
	4-year program	3	3.2
GCS education history	From school	63	67
	From hospital	31	33
Religion	Yes	40	57.5
	No	54	42.5

Table 1

Participant's General Characteristics (N = 94) cont.

Variables	Category	Number	%
Marital status	Married	53	56.4
	Single	41	43.6
Level of confidence	Very confident	78	83
	A little confident	16	17
	Not confident	0	0
	Not confident at all	0	0
Level of importance	Very important	94	100
	A little important	0	0
	Not important	0	0
	Not important at all	0	0

5.2 The Accuracy of GCS Knowledge

In the section that explored the GCS knowledge of nurses, they had a high percentage of correct answers in the first part of the questionnaire. Nearly all of nurses knew about the GCS and were aware of its three components; only two nurses answered incorrectly. However, when they listed the name of each component, many nurses (28.7%) put the wrong name or confused the exact name; other nurses just wrote in a very short form such as “eye” or “verbal.” Five participants made errors with regard to identifying the point value of each component (5.3%). With regard to the question of minimum score of three components, all participants gave the correct response. With regard to the maximum score of 15, two nurses gave an incorrect answer. In the clinical scenario, the correct result of the sum score is six. Most nurses in the wrong group marked seven points, and the incorrect answers ranged from three to ten. Nurses had to determine a point value for each component as well as the total score. The majority of the nurses in the wrong answer group confused the motor assessment score of three by four points. For that reason, the wrong answer group accounted for 51.6% of the nurses in comparison with the right answer group (47.9%). To determine the sum score for knowledge of the GCS, a value of one was assigned for a right answer and a value of zero was assigned for a wrong answer for questions one to six. In the clinical scenario, the nurses had to provide correct answers both for the total points and each component point. The highest score was six, while the lowest score of zero was not obtained by any of the participants. The mean score and the standard deviation were 5.03 and 0.82, respectively.

Table 2

The Accuracy of GCS Knowledge (N = 94)

Variables	Right *n* (%)	Wrong *n* (%)
Question 1. How many GCS component	92 (97.9)	2 (2.1)
Question 2. GCS name component	67 (71.3)	27 (28.7)
Question 3. GCS each point	89 (94.7)	5 (5.3)
Question 4. GCS min value	94 (100)	0 (0.0)
Question 5. GCS max value	92 (97.9)	2 (2.1)
Question 6. Clinical scenario	45 (47.9)	49 (52.1)
Total score for knowledge	Range: 0–6	
	Mean (SD): 5.03 (0.82)	

5.3 The Accuracy of GCS Performance

The descriptive statistic was used to describe the accuracy of performance. Each participant's assessment results were classified as either correct or incorrect by comparison to the expert's score. The summary results are presented in Table 3. The 3 categories of GCS scale were recorded: eye opening, verbal response, and motor response assessment. The last section is the group performance; the correct performance group had to provide a correct score for all three components when compared to the researcher's result. In general, there was an average percentage of agreement between the nurse's score and researcher's score. The highest agreement was found in motor evaluation (78.7%). A similarly rate (75.5%) was shown with respect to verbal response. Most errors were found with regard to eye opening, and this component had the lowest correct assessment when compared with verbal and motor components (68.1% compared to 75.5% and 78.7%, respectively). On the basis of the three assessments used to differentiate the correct and incorrect group, the GCS performance of the correct group was quite low. Less than half of the nurses provided accurate responses for all three components. In total, 40 nurses (42.6%) were assigned to the correct group while the incorrect group consisted of 54 (57.4%) nurses, the number of which increased strongly as a result of the sub-component assessment. Hence, we have to explore the factors that lead to the inaccurate practice.

Table 3

The Accuracy of GCS performance (N = 94)

Variables	Correct performance *n* (%)	Incorrect performance *n* (%)
Eye opening	64 (68.1)	30 (31.9)
Verbal response	71 (75.5)	23 (24.5)
Motor response	74 (78.7)	20 (21.3)
All 3 components	40 (42.6)	54 (57.4)

5.4 The Difference in Knowledge Between the Correct and Incorrect Group

To examine the difference between the nurses' knowledge of GCS and their practice, *t* test analysis was performed to compare the mean score of the correct group and incorrect group with regard to GCS assessment. The results are displayed in Table 4. The main variable is the knowledge score, which was comprised of six questions with a maximum score of six. The correct performance group (5.38 (0.82)) had a higher mean score than the incorrect group (4.78 (0.71)), which was statistically significant ($t = 3.71$, $p = .001$).

Table 4

GCS Knowledge Between Correct and Incorrect Performance Groups (N = 94)

	Correct performance group ($n = 40$)		Incorrect performance group ($n = 54$)			
Variables	M	SD	M	SD	*t*	*p*
Knowledge score	5.38	0.83	4.78	0.71	3.71	.001

Note: $p < .05$.

5.5 The Difference in Knowledge and Performance by General Characteristics

The general characteristics of the nurses were examined to explore the level of difference in nurses' GCS knowledge and performance by ANOVA and chi-square tests. Among the general characteristics variables, the variables of gender and department showed a significant difference in knowledge. Female nurses had significantly higher knowledge than male nurses (F = 2.87, p = .027) due to the few male nurses in the study. The result of the difference by department is shown in Table 5. ANOVA (F = 11.92, p =. 017) and post hoc LSD testing revealed that the neurosurgery intensive care unit had higher knowledge than the neurosurgery (3B1), head injury, and neurology departments.

There was no statistically significant difference between the two correct and incorrect performance groups by general characteristics. With respect to the variable of department, a difference only occurred in knowledge but not in performance. Despite expectations, age, experience, and educational level variables did affect the knowledge and performance of GCS.

The statistical analysis is shown in Table 5 and Table 6.

Table 5

The Difference of Knowledge by General Characteristics (N = 94)

Variable	Category	Mean (SD)	*F*	*p*	Post hoc
Age	20–25	4.95 (0.66)	0.657	.62	
	26–30	5.00 (0.98)			
	>31	6.12 (0.69)			
Gender	Male	4.64 (1.28)	2.877	.02	
	Female	5.08 (0.73)			
Working experience	0–2	4.97 (2.39)	0.347	.84	
	3–7	7.78 (2.32)			
	>7	6.67 (2.08)			
Department	Neurosurgery-3B1[a]	5.00 (0.90)	11.92	.01	d>a*;d>c**;d>e**
	Neurosurgery-3B3[b]	5.17 (0.75)			
	Head injury [c]	4.75 (0.96)			
	NCU [d]	5.27 (0.875)			
	Neurology [e]	4.84 (0.50)			
Educational background	2-year program	5.03 (0.81)	0.54	.70	
	3-year program	5.00 (1.00)			
	4-year program	5.00 (1.00)			
GCS education history	From school	5.03 (0.76)	0.691	.60	
	From hospital	5.00 (0.98)			
Religion	Yes	4.75 (0.88)	1.053	.38	
	No	5.06 (0.87)			
Marital status	Married	5.06 (0.79)	0.689	.60	
	Single	5.00 (0.86)			
Level of confidence	Very confident	5.10 (0.83)	2.273	.06	
	A little confident	4.69 (0.70)			
	Not confident				
	Not confident at all				

Note: * p <.05.

** p <.01.

Table 6

The Difference of Performance Between the Correct and Incorrect Performance Group by General Characteristics (N = 94)

Variable	Category	Correct (*n* = 40)	Incorrect (*n*= 54)	χ^2	*p*
Age	20–25	8	13	0.28	.86
	26–30	17	23		
	>31	15	18		
Gender	Male	5	6	0.04	.83
	Female	35	48		
Department	Neurosurgery-3B1	7	12	1.94	.74
	Neurosurgery-3B3	9	14		
	Head injury	8	9		
	NCU	12	17		
	Neurology	4	2		
Working experience	0–2	10	23	3.55	.16
	3–7	17	15		
	>7	13	16		
Educational background	2-year program	38	48	1.23	.53
	3-year program	1	4		
	4-year program	1	2		
GCS education history	From school	27	36	4.58	.10
	From hospital	13	18		
Religion	Yes	16	31	2.2	.32
	No	24	24		
Marital status	Married	23	30	0.03	.85
	Single	17	24		
Level of confidence	Very confident	34	44	0.20	.65
	A little confident	6	10		
	Not confident				
	Not confident at all				

Chapter 6. Discussion

This study examined the accuracy of GCS knowledge and GCS performance among Vietnamese nurses. Descriptive statistics on GCS knowledge and practice reflect that although the participants use GCS regularly to assess various levels of consciousness, they had much confusion and inaccurate performance. They all perceived that the GCS is very important in treating patients, and 82.1% of the participants felt confident when they obtained a GCS score. In comparison, a survey of third year nursing students (Shoqirat, 2006) found that only 64% of students felt it was a very important scale in the neurological field, and an extremely low percentage (15%) felt very confident in GCS practice. More experience in a clinical setting will likely lead to more confident practice on patients.

A similar rate of accuracy (>90%) was found for the first four questions with the exception of question two when making a comparison with a previous study by Hiem et al. that assessed the use of the instrument by air rescue physicians (2009). Question two required nurses to write out the name of each component; 28.7% answered incorrectly while only 5.8% of air rescue physicians made errors. Nurses did not know the exact name of each component. Moreover, in the clinical scenario, more than half of the nurses (52.1%) gave the wrong answer. This rate is higher than the result in the study of Heim et al. (2009) in which one third scored the components imprecisely (36.9%). The results of this study show that although the nurses had a high rate of correct answers regarding their basic knowledge of the GCS, because of the complicated responses that can appear from the various consciousness levels of patient, nurses must have a precise and thorough understanding of the GCS so that they can provide a correct assessment. The motor response in the clinical case was still the

most difficult component and caused many mistakes by participants in both studies.

On the other hand, in the survey of the performance of nurses in GCS recording, a comparison of the results collected by nurses with those of the researcher demonstrated various levels of agreement. The highest performance accuracy of nurses was seen in the motor response component, while in other investigations, moderate (60%–70%) or low (<50%) accuracy was reported due to the various methods utilized in practice (Holdgate et al., 2006; Zuercher et al., 2006). As reported in their studies, the right painful stimulus application is the key to evaluate the best patient response. Nurses in this study had the appropriate skills to elicit a motor response from their patient. A high level of agreement was observed in the verbal component (71 of 94 nurses had a correct score). The moderate accuracy of eye-observation performance was similarly explored. It is believed that eye assessment is simpler than motor and verbal response resulting from the complicated patient response. In one investigation using a video tape recorder to measure inter-rater reliability among nurses in different departments, the authors found contradictory findings. Only 30% of nurses correctly rated the motor component, as compared to 50% for eye opening and more than 80% for verbal response (Zuercher et al., 2009). Factors that may impact on the accuracy of GCS practice include intubation, sedatives and paralytics, and alcohol/drug use, all of which are most related to motor and verbal scoring (Edwards, 2000; Waterhouse, 2005). Another reason for inaccurate performance occurs when some departments or some nurses rate eye swelling and verbal-unresponsiveness in sedated or intubated patients by one score. It is meaningless (Ronald et al., 2005).

Although Vietnamese nurses have a high rate of accuracy in scoring the three

components of the GCS, a poor result was demonstrated when they were combined to identify the correct or incorrect group. Although nurses had enough basic knowledge of the GCS, separately, their knowledge did not cover all sections of the GCS or nurses could not integrate their understanding effectively. In a study conducted by Crossman et al. (1998) in emergency neurosurgical referrals over six months, they found that 51% of the patient referred to their center received accurate scores. The inter-rater reliability was approximately 60% among all types of medical practitioners (Rowley & Feilding, 1991).

The significant difference between the level of GCS knowledge and the accuracy of performance means that nurses that have accurate knowledge of the GCS have a tendency to perform the GCS well. This result also confirmed the importance of education or training for nurses as well as other health care providers. Continuing education was emphasized in the study of Watson, Horn, and Curl (1992). The more education the medical staff received regarding GCS knowledge, the more accurately they would perform. Practice training sessions by experts are highly effective because, without standardized methods, various methods can be applied and lead to inaccuracy. The fact that this study concurrently examines nurses' GCS knowledge and GCS performance is different from many researches. They are comprised solely of theoretical knowledge (Heim et al., 2009; Ronald et al., 2005) or examine the inter-reliability of the GCS in practice such as between experienced and inexperienced nurses, nurses and physicians, non physicians and senior physicians, and pre-hospital and hospital personnel (Arbabi et al., 2004; Holdgate et al., 2006; Menegazzi, Davis & Paris, 1993; Rowley & Feilding, 1991).

The GCS is generally considered one part of clinical assessment and decision

making. Most nursing staff responsible for ongoing monitoring by GCS relied on GCS score to recognize the patient's condition among those with an altered level of consciousness. Therefore, the accuracy of the assessment has a significant impact on the treatment process. A significant difference in knowledge was established among all four units except one, and a post-hoc test pointed out that the NCU unit had a higher mean score on knowledge as compared to the other three units. Therefore, more education is needed for nurses who work in other general-neurosurgery wards. On the contrary, department factors did not produce a significant different in nurse GCS performance. Nurses who worked in the neurosurgery intensive care unit might have much more knowledge about the GCS, but it was not enough to produce a high rate of accuracy in performance. They need more training in practice. However, according to earlier published research, the accuracy of the score was limited by the severity of the patient's status. Excellent accuracy was observed in GCS scores from 13–15; moderate accuracy was observed in scores from 9–12, and low or even poor accuracy was observed in scores under 8 points (Arbabi et al., 2004). All patients in the NCU unit were in a semi-comatose or comatose condition with scores of ten or below. We found no statistical significant difference by age, working experience, or level of education, which several studies reported as the main reason for differences in the level of performance accuracy. Further investigation needs to be implemented to fully understand the relationship among these variables.

Chapter 7. Study Limitations

The present study has several limitations**.** A convenience sample of nurses cannot be generalized to the larger population. Only nurses in the five departments of CR hospital that treat and care for brain trauma or neuropathology patients participated in the study. Patients in the study were recruited from the same departments. Therefore, the level of consciousness was also dependent upon the departmental treatment role. Most patients in the head injury department had GCS scores from 13 to 15, while patients who were assessed in the NCU had scores from 3 to 10. No significant difference was found with respect to educational background because 87 nurses out of 94 (>90%) underwent two-year nursing training. This reveals a common problem of low Vietnamese nursing education. The general characteristics of the participants did not include information about the amount of neuroscience experience. Thus, the nurses might have had greater experience in another field of nursing care rather than neuroscience.

Chapter 8. Conclusions and Suggestions

8.1. Conclusions

The GCS is considered one of the most reliable internationally standardized tools to measure alterative levels of consciousness after head injury. It quickly gained worldwide usage after it was presented by Teasdale and Jennet in 1974. It is considered a cheap and simple instrument to be utilized in medical care. However, many studies found inaccuracy in the clinical usage of the GCS related to insufficient knowledge by health care professionals. This study aimed to examine the accuracy of GCS knowledge and performance among Vietnamese nurses. The cross-sectional descriptive study was conducted with a convenience sample of 94 nurses. Data was entered into the SPSS program (version 17.0) and then analyzed by descriptive statistic, *t* test, ANOVA, and chi-square test.

The results are summarized as follows:

1. The age of the nurses ranged from 20 to 51, and 35.1% of the nurses had two or less years of working experience. The majority of the nurses were female, and 91.5% graduated from a two-year training program. Most nurses felt confident about performing the GCS and were aware of its importance.

2. With regard to the accuracy of GCS knowledge, >90% of nurses provided the right answers with the exception of question two (71.3%). However, only 47.9% of the nurses provided the right answer in the clinical scenario.

3. In the accuracy of performance section, high accuracy was observed in the motor and verbal subscale (77.9% and 74.5%). Moderate accuracy was observed for eye score (67.4%). All three components rated the lowest percentage (42.1%) of accuracy.

4. A significant difference of knowledge existed between the correct and incorrect performance groups (t = 3.71, p = .001).

5. The different of knowledge was significant by nurse gender (F = 2.877, p = .027) and department (F = 11.92, p = .017) variables. Post hoc tests showed that the nurses in the NCU department had significantly higher knowledge than the neurology, head injury, and neurosurgery (3B1) departments.

Although most of the nurses had suitable knowledge of the GCS, their theoretical knowledge application needs to be improved to ensure accurate clinical practice. The clinical scenario required a score for each component, and more than half of the nurses provided the wrong answer. On the contrary, in real situations, the nurses demonstrated high accuracy in each component; however, in all three components, less than half of the participants performed correctly.

The findings of this study indicate that Vietnamese nurses have highly accurate basic knowledge of the GCS, but it is not enough to ensure accurate performance. The differences in knowledge indicate the need for more education and practical training to reduce the various errors in GCS scoring.

8.2. Suggestions

The results of this study suggest that a suitable training program should be implemented to promote more accurate and reliable GCS scoring. On the basis of these findings, further study with a large sample size should be implemented to determine the most effective training model with respect to GCS.

References

Arbabi, S., Jurkovich, G. J., Walh, W. L., Franklin, G. A., Hemmila, M. R., Taheri, P.A & Mairer, R. V. (2004). A comparison of prehospital and hospital data in trauma patients. *Journal of Trauma, 56*, 1029- 1032.

Bazarian, J. J., Eirich, M. A & Salhanick, S. D. (2003). The relationship between pre-hospital and emergency department Glasgow coma scale score. *Brain Injury, 17(7),* 553- 560.

Basso, A., Previgliano, I., Duarte, J. M& Ferrari, N. (2001). Advances in management of neurosurgical trauma in different continents. *World Journal of Surgery, 25 (9)*, 1174-1178. Brunker, C. (2006). Assessment of sedated head- injury patients using glasgow coma sacle: An audit. *British Journal of Neuroscience, 2(6)*, 276- 280

Crossman, J., Bankes, M., Bhan, A & Crockard, H. A. (1998). The Glasgow coma scale: reliable evidence? *Injury, 29(6)*, 435- 437.

Edward, S. L. (2001). Using the glasgow coma scale: analysis and limitation. *British Journal of Nursing, 10*, 92- 101.

Fisher, J & Mathieson, C. (2001). The History of the Glasgow coma scale: implications for practice. *Critical Care Nurse, 23(4)*, 52- 58.

Glasgow Coma Scale definition. In Mosby's medical dictionary 8th edition *online.* Retrieved

from http://medicaldictionary.thefreedictionary.com/Glasgow+Coma+Scale

Gururaj, G. (2002). Epidemiology of traumatic brain injuries: Indian scenario. *Neurological Research, 24*, 24-28.

Heim, C., Schoettker, P., Gilliard, N., & Spahn, D. R. (2009 September 1). Knowledge of Glasgow coma scale by air- rescure physicians. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 17(39)*, 1- 6.

Heron, R., Davie, A.., Gillies, R., Courtey, M. (2001). Interrater reliability of the Glasgow coma scale scoring among nurses in sub- specialities of critical care. *Australia critical care, 14(3)*, 101- 105.

Holdgate, A.,Ching, N., & Angonese, L. (2006). Variability in agreement between physicians and nurses when measuring the glasgow coma scale in the emergency department limits its clinical usefulness. *Journal of Emergency Medicine Australasia, 18(4)*, 379- 384.

Iankova, A. (2006). The Glasgow coma scale clinical application in emergency departments. *Emergency Nurse, 14(8)*, 31- 35.

Juarez,V. J & Lyons, M. (1995). Interrater reliability of the Glasgow coma scale. *Journal of Neuroscience Nursing, 27,* 283- 286.

Kingston, R & O'Flanagan, S. J. (1990). Scoring system in trauma. *Irish Journal of*

Medicine Science,169(3), 168- 172.

Lacono, L,.A & Lyons, K. A. (2005). Making GCS as easy as 1, 2, 3, 4, 5, 6. *Journal of Trauma nursing, 12(3),* 77- 81.

Levine, J. J. (1997). Head injury in Vietnam. *The Vietnam Business Journal*. Retrieved from http://www.bhsi.org/vietnam.htm

Marion, D. W & Calier, P. M. (1994). Problems with initial Glasgow coma scale assessment caused by prehospital treatment of patients with head injuries : result of a national survey. *Journal of Trauma, 36,* 89- 95.

Matis, G & Birbilis, T. (2008). The Glasgow coma scale- a brief review. Past, present, future. *Acta neurologica belgica, 108.* 75- 89.

Mattar, I., Fai, C. M., Cstat & Ying, L. S. (2009). A comprehensive systematic review of the factors that impact nurses performance in conscious level assessment. JBI systematic review protocol, Retrieved from http://www.joannabriggs.edu.au/protocols/Protocol334.pdf

Menegazzi, J. J., Davis, E. A & Paris, P. M. (1993). Reliability of the glasgow coma scale when used by emergency physicans and paramedics. *Journal of Trauma, 34,* 46-48.

Norwood, S. H., McAuley, C. E., Berne, J. D., Creath, R. G & Mclarty, J. (2002). A

prehospital Glasgow coma scale score < or = 14 accuretely predicts the need for full trau ma team activation and patient hospitalization after motor vehicle collisions. *Journal of Trauma, 53(3),* 503- 507

Polit, D. F & Hungler, B. P. (1991). Nursing research principle and method, 483- 488

Riechers, R. G., Ramage, A., Brown, W., Kalehua, A., Rhee, P., Ecklund, J. M & Ling, G. S. F. (2005). Physician knowledge of the Glasgow coma scale. *Journal of Neurotrauma, 22(11),*1372- 1334.

Rowley, G & Feilding, K. (1991). Reliability and accuracy of the Glasgow coma scale with experienced and inexperienced users. *Lancet , 337,* 535- 538.

Rush, C. (1997). The History of the Glasgow Coma Scale: An interview with Professor Bryan Jennett. *Journal of Trauma Nurs, 3,* 114- 118.

Shah, S. (1999). Neuro assessment. *Nursing Standard, 13(22),* 49- 54.

Shoqirat, N. (2006). Nursing students' understanding of the Glasgow coma scale. *Nursing Standard, 20(30),* 41- 47.

Teasdale, G. M., & Murray, L. Revisiting the Glasgow coma scale and coma score. *Intensive Care Medicine, 26,* 153- 154.

Waterhouse, C. (2005). The Glasgow coma scale and other neurological observations. *Nursing standard, 19(33)*, 56- 64.

Watson, M., Horn, S & Curl, J. (1992). Searching for signs of revival. Uses of the Glasgow coma scale. *Professional Nurse, 7(10)*, 670- 674.

Weir, C. J., Bradford, A. P. J., & Lees, K. R. (2003). The prognostic value of the components of the glasgow coma scale following acute stroke. *An International Journal of Medicine, 96*, 67- 74.

Zuercher, M., Ummenhofer, W., Baltussen, A., & Walder, B. (2009). The use of glasgow coma Scale in injury assessment: A critical review. *Journal of Brain Injury, 23(5)*, 371-384.

Appendix A

Nurse's (ID):

Nurse's general information

1. Department:
   □. Neurosurgery (3B1)
   □.Neurosurgery (3B3) □. Head injury
   □. NCU □. Neurology
2. Age:
3. Gender: □. Male □. Female
4. Working experience: ……..years……months>
5. Educational background:
   □. 2- year program □. 3- year program
   □. 4- year program □. Master of nurse
6. Religion: □. Christian □. Catholic
   □. Buddhism □. Other
7. Marital status:
   □. Married □. Single
8. History GCS Education:
   □. From school
   □. From hospital

Question	Very confident	A little confident	Not confident	Not confident at all
How confident do you feel about your knowledge of the GCS?				

Question	Very important	A little important	Not important	Not important at all
How much importance do you feel on GCS?				

ID:

Thông tin chung của điều dưỡng

1. Bệnh viện:
2. Khoa:

□ Ngoại Thần Kinh (3B1) □ Ngoại Thần Kinh (3B3)

□ Trại 6 chấn Thương □ Hồi sức Ngoại Thần Kinh

□ Nội Thần Kinh

3. Tuổi:
4. Giới tính: □. Nam □. Nữ
5. Kinh nghiệm làm việc: ..... năm.....tháng
6. Trình độ chuyên môn:

□ Trung hoc điều dưỡng □ Cao đẳng điều dưỡng

□ Cử nhân điều dưỡng □ Thạc sĩ điều dưỡng

7. Tôn giáo:

□ Thiên chúa giáo □ Tin lành

□ Phật giáo □ Khác:……

8. Tình trạng hôn nhân: □ Kết hôn □ Độc thân

9. Lịch sử đào tạo Glasgow Coma Scale: □ Từ trường:

□ Từ bệnh viện

10.

Câu hỏi	Rất tự tin	Ít Tự tin	Không tự tin	Không hề tự tin
Bạn cảm thấy tự tin như thế nào với kiến thức của bạn về thang điểm đánh giá hôn mê Glasgow?				

11.

Câu hỏi	Rất quan trọng	Ít quan trọng	Không quan trọng	Không hề quan trọng
Bạn cảm thấy thang điểm đánh giá hôn mê Glasgow quan trọng như thế nào?				

Appendix B

Nurse's ID:

Below is the list of question about the knowledge of Glasgow Coma Scale. Please fill out all the questions after reading carefully. Time is limited in 15 minutes.

1. How many components contain the Glasgow Coma Scale?

1[ ] 2[ ] 3[ ] 4[ ] 5[ ]

2. List the components of the Glasgow Coma Scale

……

3. How many points belong to each single component? (Ex.: Component 1 = 9 points)

……

4. Minimal value obtainable in the Glasgow Coma Scale? ……

5. Maximal value obtainable in the Glasgow Coma Scale?……

6. Below is a clinical scenario in ED. You should read carefully and answer the following the question.

37 year old patient who sustained a motor vehicle accident. Airways are clear, bilateral air entry. BP 110/85, HR 120/minute, Saturation 96%. No response to questioning, pinching of the right nipple elicits moaning and abnormal flexion of both arms. When you open his eyes, which are still closed, you notice pupils equal and reactive to light.

Glasgow Coma Scale:.....

Points per component:...../...../...../...../...../...../.....

GCS KNOWLEDGE AND PERFORMANCE IN VIETNAMESE NURSES

ID:

Dưới đây là bảng câu hỏi kiến thức về thang điểm đánh giá hôn mê Glasgow. Hãy trả lời sau khi đọc kĩ các câu hỏi. Thời gian để trả lời các câu hỏi là 15 phút.

1. Thang điểm đánh giá hôn mê Glasgow gồm bao nhiêu thành phần ?

1[ ] 2[ ] 3[ ] 4[ ] 5[ ]

2. Hãy liệt kê các thành phần của thang điểm đánh giá hôn mê Glasgow? ……

3. Mỗi thành phần gồm bao nhiêu điểm? (ví dụ.: thành phần 1 = 9 điểm) ……

4. Giá trị nhỏ nhất có thể đạt được trong Thang điểm đánh giá hôn mê Glasgow ? ……

5. Giá trị lớn nhất có thể đạt được trong Thang điểm đánh giá hôn mê Glasgow ? ……

6. **Dưới đây là kịch bản lâm sàng tại khoa cấp cứu. Bạn nên đọc kĩ tình huống và trả lời các câu hỏi sau.**

Một bệnh nhân 37 tuổi được cứu sống sau một tai nạn xe máy. Đường thở sạch, khí vào hai bên mũi. Huyết áp 110/85, nhịp tim 120/phút, độ bão hòa oxy máu 96%. Không có phản ứng với việc hỏi, véo đầu vú phải gây ra sự rên rỉ và co bất thường cả hai tay. Mắt bệnh nhân vẫn nhắm khi bạn mở mắt bệnh nhân, bạn nhận thấy đồng tử hai bên đều và có phản xạ với ánh sáng.

6.1 Thang điểm hôn mê Glasgow: .....?

6.2 Số điểm trên mỗi thành phần:...../...../...../...../...../...../.....

Appendix C

GCS score on performance

	Nurse		Expert	
GCS score	Eye opening		Eye opening	
	Verbal response		Verbal response	
	Motor response		Motor response	
Total score				

ID:

Đánh giá thang điểm hôn mê Glasgow trong thực hành

	Điều dưỡng		Chuyên gia	
Điểm GCS	Mở mắt		Mở mắt	
	Đáp ứng lời nói		Đáp ứng lời nói	
	Đáp ứng vận động		Đáp ứng vận động	
Tổng điểm				

Appendix D

Informed Consent Form

I understand that I am being asked to participate in research of master nursing student, Ajou University and teaching assistant in Medical and Pharmacy of Ho Chi Minh city. This research study will evaluate the knowledge and the performance of Vietnamese nurses on Glasgow Coma Scale. Researcher asked me to participate in this study because I am a nurse who works with Glasgow Coma Scale frequently. My participation in this study is entirely voluntary and i may with draw from the study at any time you wish.

If I agree to participate in this study, I will firstly give some your general information and answers the questionnaire independently. Then the result of my performance on GCS with patients who are assigned by researcher will be collected. Total time that I spend for the research is about 30- 45 minutes. The researcher and her co-worker will observe me to complete the participating in study.

All information that I provide will be keep in confidential and only use for purpose of study for nursing publications or presentations.

If you need to, please contact with Ms. Hien, Medical and Pharmacy of Ho Chi Minh city, Nursing Department by cell phone number: 0989-616-722

I have been explained carefully. I have read and understand the consent form. I agree to participate in this study. I understand that I will be given a copy of this signed consent form.

Signature of subject **date**

Signature of investigator **date**

Giấy cam kết

Tôi hiểu là tôi đang được đề nghị tham gia vào một nghiên cứu của một sinh viên thạc sĩ điều dưỡng, thuộc Đại học Ajou và là giảng viên trợ giảng thuộc Đại học Y Dược Thành phố Hồ Chí Minh. Nghiên cứu này nhằm mục đích khảo sát sự chính xác về kiến thức và thực hành trong việc sử dụng thang điểm đánh giá hôn mê Glasgow. Tôi được mời tham gia bởi vì tôi là là một điều dưỡng sử dụng thang điểm đánh giá hôn mê Glasgow thường xuyên. Sự tham gia của tôi vào nghiên cứu là hoàn toàn tự nguyện và tôi có thể ngừng không tham gia nghiên cứu bất cứ khi nào tôi muốn.

Nếu tôi đồng ý tham gia vào nghiên cứu, tôi sẽ được đề nghị cung cấp một số thông tin chung ca trả lời bảng câu hỏi một cách độc lập. Sau đó kết quả đánh giá thang điểm đánh giá hôn mê Glasgow của tôi với một bệnh nhân do người nghiên cứu chỉ định sẽ được ghi nhận lại. Tổng thời gian cho ngiên cứu trong vòng khoảng 30-45 phút. Nhà nghiên cứu và cộng sự của cô ấy se quan sát tôi trong suốt thời gian tôi hoàn thành ngiên cứu này.

Tất cả những thông tin mà bạn cung cấp sẽ được cất giữ ở nơi an toàn và chỉ được dùng cho mục đích nghiên cứu này mà thôi. .

Nếu bạn có bất cứ câu hỏi nào liên quan đến nghiên cứu này, hãy vui lòng liên hệ với chị Nguyễn Thị Hiền, Đại học Y Dược Thành phố Hồ Chí Minh, bộ môn Điều Dưỡng qua số điện thoại: 0989-616-722

Tôi đã được giải thích một cách cẩn thận. Tôi đã đọc và hiểu thư chấp thuận này. Tôi đồng ý tham gia nghiên cứu. Tôi sẽ được giao một bản photo của lá thư này.

Điều dưỡng (kí tên) ngày tháng năm.

Nhà nghiên cứu(kí tên) ngày tháng năm.