NEUROLOGICAL NURSING ASSESSMENT EDUCATION AT INTERMOUNTAIN MEDICAL CENTER: A QUALITY IMPROVEMENT PROJECT

by

Candice Carter Jones

A DNP Project Submitted to the Faculty of the

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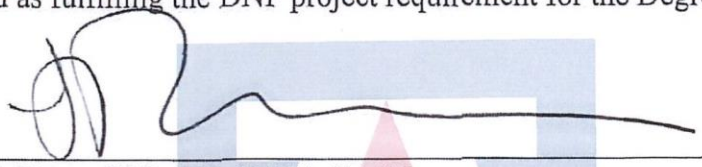
As members off the DNP Project Committee, we certify that we have read the DNP project prepared by *Candice Carter Jones*, titled *Neurological Nursing Assessment Education at Intermountain Medical Center: A Quality Improvement Project* and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.



Date: July 31, 2018

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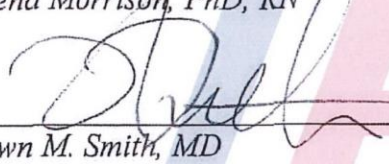

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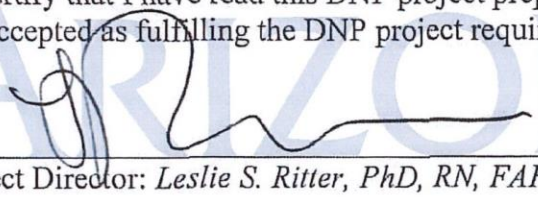
Shawn M. Smith, MD

Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.



Date: July 31, 2018

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SIGNED: Candice Carter Jones

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DEDICATION

I dedicate this DNP project to my late father Lynn D. Carter and my daughter Ally Harper Jones.

Unfortunately, my father was taken at the young age of 53 from a sudden cardiac arrest. He was one of the strongest, caring, and giving men I have ever known. He taught me the value of hard work, sacrifice, and consistency. I have wanted to emulate all of these things you taught me in my life. Thank you for always being the perfect example, pushing me to achieve more and "to go far in life" and how hard work pays off. I know you are proud of me and will always be with me.

To my daughter Ally thank you for teaching me the real meaning of life, patience, and what unconditional love really means. Always chase your dreams and go big!

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ABSTRACT

Background and Aims: Nursing assessments are an integral part of the nursing process that may have significant impact on patient outcomes. Nursing assessments often identify potentially life threatening conditions such as acute neurological events. Inconsistencies of neurological assessments can occur for nurses who do not routinely perform these exams; furthermore, nurses need to be able to identify normal vs. abnormal neurological findings. The aims of this project were to deliver neurological assessment education and assess nurses': 1) ability to identify neurological assessment components; 2) ability to identify normal vs. abnormal neurological findings; and, 3) and their perceptions of a one-time face-to-face neurological assessment education.

Design, Setting and Population: This quality improvement project uses a descriptive study design. The study took place at Intermountain Medical Center (IMC) in Murray, Utah. Full time nurses (N=31) from medical surgical units participated in the study.

Methods and Data Analysis: A 40-minute neurological assessment PowerPoint education module was developed and presented in lecture format in five different sessions. A 17 question pre- and 17 question post-education survey was conducted at the time of the education. Overall pre- and post-survey scores and scores representing ability to identify neurological assessment components and normal vs. abnormal assessment findings were described as means +/-SD and compared using t-tests. Perceptions of the education were assessed using a Likert scale.

Results: There was a significant increase in overall post-survey scores (88.6+/-13.3) vs. pre-survey scores (77.2+/-16.7) (p=0.001). After the education, there was significant increase in the ability to identify neurological assessment components (p=.002) and a significant increase in the

ability to identify normal vs. abnormal neurological findings (p=.004). A large percentage (90%) of the nurses perceived the education as beneficial.

Conclusion: A one time, face to face neurological assessment education significantly increased the ability of medical surgical nurses at IHC to identify neurological assessment components and identify normal vs. abnormal neurologic findings. Nurses perceived the education as beneficial. Findings support the need for ongoing education for neurological assessments to increase knowledge and confidence in neurological assessment which ultimately could improve patient outcomes.

INTRODUCTION

The nursing process is a systematic method nurses use to plan and provide patient care (Kaur, 2009). The American Nurses Association (ANA) guides the competencies for bedside nurses and the nursing profession (ANA, 2014). Nursing assessments can be focused, emergent, or comprehensive, are patient focused as they are consumers of nursing and healthcare services (Hinkle & Cheever, 2014; Kaur, 2009). Nursing assessment approaches are from head-to-toe and focus on all body systems. The neurological system is one body system that is complex, requiring attention to detail and mastery of complex skills by bedside nurses. These skills can be acquired through educational experiences, clinical experience, and demonstration by experienced clinical providers. Neurological assessments require bedside nurses to use clinical reasoning, critical thinking, and holistic care approaches when planning, implementing, and evaluating care in this population (Bickley, 2013). Inconsistencies in neurological nursing assessments may occur as a result of improper training, education, or clinical experience by bedside nurses (Mavin, 2009; Rank, 2013). These inconsistencies may affect patient outcomes. Therefore, neurological nursing assessment education for bedside nurses is imperative.

Background

A need for standardization of nursing assessments education exits with focus on comprehensive and focused assessments for improved clinical competencies. Nurses' decision making in clinical practice is based on patient situations, observations, experience, critical thinking, and academic background (Ansell, Meyer, & Thompson, 2015; Mikami et al., 2014). External factors, such as information technology (electronic health records), level of education, thought process, and years of experience influence nursing assessments (Ansell, Meyer, &

Thompson, 2015; Mikami et al., 2014). For successful implementation and education of standardized nursing assessments, clear goals must first be communicated among healthcare staff and leaders (Zaccagnini & White, 2017). Identification of a need for change in this process is necessary. When change is recognized, training time for employees, understanding learning curves among staff, and clear communication must all be incorporated into the planning phase of projects for quality improvement (Zaccagnini & White, 2017). Stakeholders are an essential component for this quality initiative. Stakeholders can include administrators, physicians, quality improvement teams, bedside nurses, and core leadership practice teams (Porter-O'Grady & Malloch, 2015). For an organization that cares for neurologic patients and is concerned with neurologic assessment education, additional stakeholders might include neurologists, neurosurgeons, neurology educators, specific neurology care committees, and administrative support for the use of facility equipment for educational purposes.

There is growing evidence that nurses have significant impact on patient outcomes (Rothman, Solinger, Rothman, & Finlay, 2012). The nursing assessment is an integral part of the nursing process that will affect patient outcomes. Furthermore, neurological assessments often identify potentially life threatening conditions which may have profound effects on patient outcomes (Hinkle & Cheever, 2014). Critical components of the nursing neurological assessment include patient's level of consciousness (LOC), mental status and cognition, cranial nerves, motor response, reflexes, sensation, and gait (Bickley, 2013). It has been documented that nurses who do not routinely perform a neurological assessment that include these critical components often require skills review and education pertinent to these exams (Rank, 2013). It is also important to note that in many hospital organizations the requirement for nursing neurological

assessment is not confined to the neurological intensive care units (ICU) or the emergency department but is in place on medical-surgical units (Rank, 2013).

Local Problem

Intermountain Healthcare (IHC) is a non-profit healthcare system serving the intermountain west. Intermountain Medical Center (IMC) is a 504 bed level one trauma center that is an IHC facility. In 2017, the Neuro Education Committee performed a root cause analysis after a sentinel event. The Neuro Education Committee recognized there was no standardized neurological assessment education for medical-surgical nurses at IMC. In order to ensure quality and safety for all patients and avoid sentinel events, the need to standardize the neurological nursing assessment education was identified.

Purpose

The purpose of this quality improvement initiative was to deliver neurological assessment education via face-to-face in-service format. A pre- and post-test will accompany the education and will evaluate neurological assessment knowledge and perceptions of the value of the education. The long-term goals of this and future work is to increase bedside nurse's knowledge and skills when performing neurological assessments for improved patient care.

Study Questions

After completing neurological assessment education will medical-surgical nurses be able to:

1) Correctly identify the components of a neurological assessment?
2) Correctly identify normal vs. abnormal neurological findings?
3) Perceive the education as beneficial?

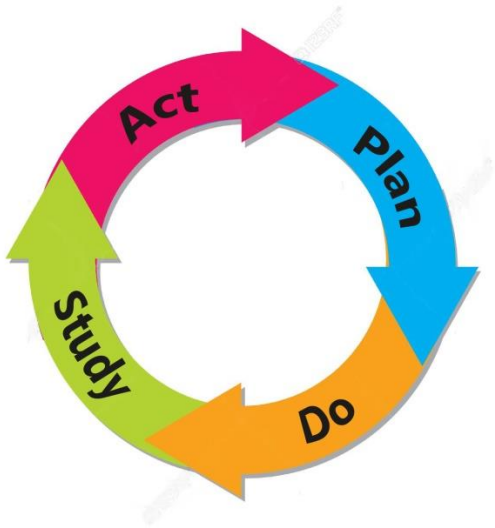
FRAMEWORK AND SYNTHESIS OF EVIDENCE

Theoretical Framework

This quality improvement project will utilize the Plan-Do-Study-Act (PDSA) framework (Institute for Healthcare Improvement, 2017). PDSA frameworks are widely used for quality improvement and clinical audits in healthcare settings (Gillam & Siriwardena, 2013). They are also utilized in healthcare research and large-scale institutions not replacing models of an existing organization, rather accelerating change and improvement processes (Institute for healthcare Improvement, 2017). PDSA is completed by promotion of small-scale changes, to evaluate the extent of change that worked, prior to the implementation of large-scale changes in healthcare organizations (Gillam & Siriwardena, 2013). PDSA methods are typically ongoing, allowing for adjustments to be made during the change process. This framework allows for continual analysis of change for improvement and adoption of new innovation and improved practice.

Consisting of four phases: Plan, Do, Study, Act (Figure 1). Planning is the first step, making prediction about change and developing a plan to test the change (Gillam & Siriwardena, 2013). Setting aims that are time specific and defining the patient or system affected occurs during planning moving on to implementation of change (IHI, 2017). Analysis of data prior to change and after implementation of change is the next phase, comparing data to predictions made during planning (Gillam & Siriwardena, 2013). Conclusions from cycle are completed, documenting what worked and what did not work during the implementation of change (Agency for Healthcare Research and Quality [ARHQ], 2015). Determinations are made to continue

another small-scale cycle, or if implementation worked larger-scale change may take place (ARHQ, 2015).



Modified from Institute for Healthcare Improvement (2017)

FIGURE 1. PDSA cycle.

Concepts

The concepts that form the basis for the questions of this quality improvement project include: increase medical-surgical nurses' neurological assessment competencies and skills as well as their perception of education. The goal to develop standardized neurological assessment education by increasing nurses' knowledge in proper examination technique requires skill, competence, and knowledge, requiring measurement after intervention. Bandura (1988) outlined competency through modeling, strengthen beliefs to increase competency level for talent use, and enhancement of self-motivation using goal systems. Strengthening nurse's knowledge competency levels of neurological assessments and elevating skill level enhances confidence, providing knowledge integral for patient care performed by bedside nurses (Hinkle, Sullivan,

Villanueva, & Hickey, 2012). Educational concepts presented to nurses should increase their clinical knowledge and skill, allowing them to gain proficiency in assessment skills.

Literature Review

The neurological system is complex requiring providers to have a concrete understanding of the components for assessment. Multiple assessment tools, tool kits, best practice guidelines (BPG), and the Glasgow coma scale (GCS) and National Institute of Health Stroke Scale (NIHSS) are commonly used in clinical practice today in all areas of clinical nursing. Nurses in all practice settings complete neurological assessments (Gocan & Fisher, 2008; Rank, 2013). These assessments are completed on initial admission and routinely when there are changes in patient's neurological status (Gocan & Fisher, 2008). Assessment tools are often utilized for assessments including: level of consciousness, orientation, motor strength, pupil size, speech, language, vital signs, and blood glucose (Gocan & Fisher, 2008; Hinkle & Cheever, 2014).

Current Clinical Tools

Braine and Cook (2016) investigated the use of the GCS and its use in the clinical setting, identifying a lack of clarity and consensus in tool use. Lack of clarity and tool use in the clinical setting, requires identification of evidence-informed approaches to practice for improved care (Braine & Cook, 2016). GCS is an established scale widely used worldwide by nurses, physicians, and other healthcare staff members. GCS rates the best eye, verbal, and motor responses for evaluation of level of consciousness, communicating findings to other healthcare team members (Braine & Cook, 2016; Reith, Brennan, Mass, & Teasdale, 2016). This scale has been extensively researched to evaluate nurses' and physicians' understanding for proper interpretation of patient neurological status, findings of misinterpretation and misapplication are

commonly reported (Mattar, Liaw, & Chan, 2013). Research surveys evaluating teaching of the GCS found 68% of students both medical and nursing are not competent in using the GCS in a clinical setting, even with training and education (Reith, Brennan, Mass, & Teasdale, 2016). Insufficient teaching and lack of experience can explain assessment variation of GCS (Reith et al., 2016). Many studies have examined the use of GCS by nurses. This tool is a component of nursing curricula utilized in the clinical setting (Braine & Cook, 2016). Many nurses are not experienced in neurological assessment and undergo education for better understanding, especially when they do not work with this patient population frequently (Rank, 2013). In depth education or experience for nurses utilizing this scale is not suggested as it leads to inaccuracy in scoring which is questionable (Braine & Cook, 2016). This can be said of many clinical scales, which is a supportive argument for standardizing education of clinical tools used by providers (Braine & Cook, 2016). The GCS is a reliable clinical tool, although, improved educational efforts should be made for providers utilizing tools in the clinical setting.

The National Institutes Health Stroke Scale (NIHSS) is another reliable tool when assessing neurological impaired patients (Chiu et al., 2009). NIHSS is specific to acute neurological emergencies and often not used clinically by bedside nurses in a general medical surgical setting. NIHSS adoption by providers can be comprehensive and time consuming, with ongoing education and sustainability with new staff members (Gocan & Fisher, 2008). Gocan & Fisher found an 80% compliance rate at six months and 90% at one year when NIHSS education workshops were implemented at Ottawa Hospital in Canada. Further research is required for sustaining nurse's competency levels using NIHSS over time to assist in the development of

educational programs specific to neurological nursing assessments, care, and patient outcomes (Gocan & Fisher, 2008).

Clinical assessment tools require testing for application and use. When testing instruments for clinical utility findings suggested identifying core elements such as: ease of use, time taken, training required, format, and interpretation and meaning of relevant information (Pierce & McLaren, 2014). Multiple challenges are present today when implementing clinical tools and require time, education, and proper implementation, making it difficult to accommodate already overwhelmed staff members with increased work demands (O'Farrell & Zou, 2008).

Current Research Gaps

Multiple research gaps are present regarding nursing education, assessment, and continued education. Nursing programs and curriculum are changing, preparing nurses to enter a robust and demanding clinical environment (Pearson, 2015). Concept-based learning is being incorporated into nursing curriculum, by classifying categories of relevance to topic categories and learners must determine whether concepts do or don't apply (Pearson, 2015). Nursing assessment practices have not changed and many professionals do not perceive a change in current practice necessary at this time (Pierce & McLaren, 2014). New assessment tools are needed for clinical use and application with proper teaching techniques for understanding. Limited research is available, specific to the nursing neurological assessment, with most topics pertaining to specific acute or chronic neurological disorders. Rank (2013) describes the neurological assessment and its importance for nurses working in non-neurological nursing units. Neurological signs, symptoms, and assessments take place in multiple areas of large and small

hospitals (Rank, 2013). Knowing this, it is imperative nurses are informed with proper training and education when performing assessment techniques for optimum patient outcomes (Rank, 2013). Most studies are not within the last five to six years and are out of date with current practice. Gaps exist not only in practice but in research, requiring current studies on nurses' daily assessment techniques and daily clinical demands. Evidence supports the standardization of assessment tools for consistency among healthcare providers, such as the GCS (Reith, 2016). When nursing assessment was researched, articles from 1985-1990s were found, further supporting current evidence in this matter. Specific areas of nursing assessments were also researched with results of pressure ulcers, orthopedics, and cardiovascular assessments for patient outcomes.

Specific to this quality improvement project is identification of current competency levels in nurses' neurological assessment through education with evaluation of learning and perceptions towards learning content. Limited data is available for nursing competency and self-efficacy for nursing education as well as employment (Kennedy, Murphy, Misener, & Alder, 2015). Kennedy et al. (2015) evaluated self-efficacy in 252 third-year nursing students, concluding nurse educators influence the role of self-efficacy and knowledge for nursing competence. This study was specific to nursing students, suggesting further research include actual practicing nurses. Self-efficacy and nursing performance was found very strong by Lee and Ko (2010), with higher affectivity in nursing performance. Nurse educators are in a unique position to intentionally improve nurse's clinical competence or potentially damage it (Kennedy et al., 2015). The social cognitive theory displays evidence of the benefits of working in teams for collective efficacy (Bandura, 1988; Kennedy et al., 2015). Efficacy will vary among groups in hospital units but it is

necessary nurses' work together to deliver quality care, directly influencing performance of the group as a whole (Lee & Ko, 2010). The World Health Organization (WHO) further supports team collaboration among healthcare professionals for delivery of effective patient care (Hinkle et al., 2012). Further research is required for evaluation of nurses' individual self-efficacy as well as group performance utilizing the SCT.

Limitations in research exist pertinent to the nursing assessment among nurses as stated. Standardization of assessments, education, or tool kits is addressed in the literature regarding implementation, with goals to increase provider competency levels, and consistency of assessments by providers (Harris & Warren, 1995; Reith et al., 2016). Educators in the clinical setting need to focus on specialized nursing assessment education for improved knowledge and clinical skill, ensuring optimal performance in neurological assessment among bedside nurses (Shin, Issenberg, & Roh, 2017). In doing so, variation of assessments should decrease with healthcare providers' receiving proper education and instruction in focused assessments (Reith et al., 2014).

METHODS

Design

This quality improvement project uses a descriptive study design. Neurological assessment education was delivered to medical surgical nurses via face-to-face lecture format. Pre and post-education surveys were delivered to assess neurological assessment knowledge and perceptions of the education.

Setting

The setting of this study took place at Intermountain Medical Center (IMC) in Murray, Utah, a part of the Intermountain Healthcare System. Intermountain Healthcare (IHC) is a non-profit healthcare system serving the intermountain west. IMC is a level-one trauma center for adults and pediatrics. This facility is 504-bed facility that includes medical, surgical, trauma, orthopedic, rehabilitation, emergency, and five specialized intensive care units (ICU). Specialty ICUs include: Thoracic, Shock Trauma, Neurocritical Care, Respiratory, and Cardiovascular. Also included are operating rooms, post anesthesia care unit, labor and delivery, and post-partum units. The four medical surgical units at IMC is where recruitment will take place.

Participants

Four medical-surgical nursing units' staff was invited to attend in-service education. It was hoped that at least one-third of the nursing staff on each unit would participate in the project. Average unit nursing staff is 30-40 nurses therefore; approximately 150 nurses were invited to participate in the project, equaling a desired total participant number of 50. Inclusion criteria included all full-time registered nurses working at least 36 hours weekly and part-time registered nurses working at least 24 hours a week. Exclusion criteria include non-nursing medical staff and prn nursing staff not employed on medical-surgical units. No incentive was offered for participation. There was no funding for this project by the facility.

Neurological Assessment Education

Description of the Neurological Assessment Education

The neurological assessment education was developed by the principle investigator (PI) of this project, a critical care neurologist, and the Neuro Education Committee at IMC.

Information from clinical experience, medical textbooks, nursing assessment textbooks, and charting elements within the EHR was used to structure the education module.

The neurological assessment education was approximately 40 minutes in length and delivered via face-to-face PowerPoint presentation. The presentation was given by the principle investigator and a critical care neurologist. In general, the education included components of a focused neurological nursing assessment. Assessment components include: mental status, cranial nerves, motor function, sensation, coordination, reflexes and Glasgow Coma Scale and NIHSS. Mental status involved the examination of LOC, orientation of patient, ability to obey commands, memory, attention, and intellectual function. Cranial nerves: I-XII was reviewed by name and number followed by descriptions and examples of how to properly assess each nerve. Motor function included examination of muscle movement, muscle tone, and muscle strength. Sensation assessment included: pain and temperature, position and vibration sense, and proprioception. Reflex assessment included: grading of reflexes and assessment of reflexes, and clonus. Coordination components included: rapid alternating movements, point-to-point movements, ataxia, and observation of gait. Glasgow Coma Scale (GCS) components included: eye opening, motor response, and verbal response. Numerical scores for eye, motor, and verbal are given on slides. The components and use of the NIHSS were briefly described.

Resources. IMC had the infrastructure and resources to provide education for nurses. Rounds rooms were available for delivery of the educational lecture. Infrastructure included the Neuro Education Committee, critical care neurologist, and technological equipment. Equipment use included: computer, power point software for explanation and projector for viewing the neurological assessment education presentation.

Procedure. Neurological assessment education was advertised on nursing units. In addition, the Neuro Education Committee emailed all eligible nurses asking for their attendance and participation in the neurological assessment education lecture. During the first minutes of the face-to-face lecture, all lecture attendees received a description of the project (Appendix F), which included an invitation to participate in the study, and also: 1) a welcome letter (Appendix B); 2) IRB disclaimer form (Appendix C); and, 3) the pre- education survey (Appendix E). All attendees had the opportunity to take pre- and post-assessment surveys. Participants received the pre-education survey before the lecture took place. The post-education survey (Appendix E) was given at the end of the lecture. The pre- and post-surveys had the same ID number on them, located in the top left hand corner. A member of The Neuro Education Committee was present at lectures to collect and separate surveys. Only survey results from those who agreed to participate were included in data analysis. After taking the pre-assessment survey (approx. 10 min), the neurological assessment education lecture took place. Lecture time was approximately 40 minutes. At the end of the lecture participants then complete the post-assessment survey (approx. 5 minutes). Total time for participation was estimated to be about 60 minutes. There were five in-service education lectures scheduled across shifts (day and night) in order to give everyone the same opportunity for attendance and participation. The educational intervention took place on Monday, Tuesday, Wednesday, Thursday, and Friday at 11am and 9pm to increase opportunity for participants across shifts, for a total of five lectures. Email reminders were sent weekly (at the beginning of the study and then weekly (times 2) for a total of 3 emails) by the Neuro Education Committee members.

Data Collection

Study Questions

After completing neurological assessment education will medical-surgical nurses be able to:

1) Correctly identify the components of a neurological assessment
2) Correctly identify normal vs. abnormal neurological findings
3) Perceive the education as beneficial

Pre-education survey. The pre-education survey (Appendix E) was completely anonymous. There are two 'check' boxes on the top right of the survey indicating whether the lecture attendee agrees to participate in the study. The pre-education survey has two more 'check' boxes under the consent to participate asking nurses if they are full-time working at least 36 hours a week or part-time working at last 24 hours a week. The pre-education survey has participants ID number in the top left corner. The pre-education survey is a 17-item multiple choice survey. Pre-education survey questions address nurses' ability to correctly identify neurological assessment components. Questions 1, 4, 5, 6, 7, 9, 12, 16, and 17 align with study question 1 (SQ1). For study question 2 (SQ2), pre-education survey questions address nurses' ability to correctly identify normal vs. abnormal findings. Questions 2, 3, 8, 10, 11, 13, 14, and 15 of the survey align with study question 2 (SQ2).

Post-education survey. The post-education survey (Appendix E) was also completely anonymous. The post-education survey also includes two 'check' boxes on the top right of the survey indicating whether the lecture attendee agrees to participate in the study. The post-education survey also has two more 'check' boxes below the consent to participate asking nurses if they are full-time working at least 36 hours a week or part-time working at last 24 hours a

week. The same ID number assigned to the pre-education survey was assigned for the post-education survey and is located in the top left corner of the survey. The post-education survey is 17-item multiple choice survey. The questions (1-17) testing neurological assessment knowledge are the same as the questions in the pre-education survey but the questions and answers are ordered differently. For SQ1, post-education survey questions address nurses' ability to correctly identify neurological assessment components. Questions 1, 4, 5, 6, 9, 12, 14, 16, and 17 align with study question 1 (SQ1). For SQ2, post-education survey questions address ability to correctly identify normal vs. abnormal findings. Questions 2, 3, 7, 8, 10, 11, 13, and 15 of the survey align with study question 2 (SQ2). For study question 3, questions 18-20 use a Likert scale type, addressing nurses' perception of education, comprehension of neurological assessment education, and confidence in performing assessment.

Outcomes. Specific outcome measures for this project as previously stated include: implement neurological nursing assessment education for medical-surgical nurses at IMC. After attending the education, it is hoped that medical surgical nurses' knowledge of the neurological assessment will improve and that they perceive the education as beneficial. Future outcomes as a result of this project may benefit the partnered hospital because neurological nursing education has potential for improving bedside nurses' knowledge and clinical skill, which may translate to and in patient outcomes.

Data Analysis

For this project surveys were completed by participants, checked for errors, missing information, and un-answered responses. Data collected was manually entered into and analyzed using IBM SPSS Statistics for Windows, Version 23.0. Three separate t-tests were completed,

comparing pre- and post-education survey results to compare the overall score, the score on the neuro assessment component questions (as a whole, study question 1) and the score on the normal vs. abnormal questions (as a whole, study question 2). Significance was set at P=0.05.

Research Question 1: Correctly identify the components of a neurological assessment?

Data from the pre-education and post-education survey overall scores (as a whole) is expressed as the mean+/- the standard deviation. Statistical differences between pre- and post-education scores was compared by comparative statistics (t-test).

Research Question 2: Correctly identify normal vs. abnormal neurological findings?

Data from the pre-education and post-education survey overall scores (as a whole) is expressed as the mean+/- the standard deviation. Statistical differences between pre- and post-education scores was compared by comparative statistics (t-test).

Research Question 3: Perceive the education as beneficial?

Scaled responses of participants' perceptions of the education items (18-20) on the post education survey is displayed as descriptive statistics (e.g., percentages) to present the data.

Ethical Consideration

The purpose of this project is to implement and evaluate the effectiveness of face-to-face neurological assessment education for medical-surgical nurses. Protection of subjects aligns with the American Association of Nurses (ANA) code of ethics provision three, protecting the right of privacy and confidentiality (Winland-Brown, Lachman, & Swanson, 2015). Autonomy of participants will be respected. No identifying characteristics will be attached to the pre-education and post-education surveys. Taking the surveys and completing the education implies consent to participate. Participation is voluntary and subjects can withdraw at any time. Coercion will be

avoided by having the Neuro Education Committee, vs. unit managers send the requests for participation in the study, especially given that likelihood that unit managers and staff are aware of lack of knowledge regarding neuro assessments and the associated potential for sentinel events. No incentive is associated with participating in the study.

Beneficence will be ensured and align with educational objects. Patient data will not be included in this project, further increasing beneficence. No harm will be done to study participants and participation in surveys is completely voluntary with participant drop out at any time. Justice will be fair during all phases of recruitment, data collection, and analysis. The recruitment target of participants includes bedside nurses working in medical/surgical units at IMC. No unfair recruitment will take place during this process as it is completely voluntary. Nurses have an obligation to further develop, engage and support ethical practice, supporting nursing's body of knowledge aligning with ANA provision seven (Lachman, Swanson, & Winland-Brown, 2015b). This project seeks to contribute to bedside nurses' neurological assessment competencies and skills, for improved patient care.

RESULTS

Description of the Study Participants

Medical-surgical registered nurses from four units employed at Intermountain Medical Center (IMC) were asked to participate in this project. Inclusion criteria consisted of full-time (36 hours weekly) or part-time (24 hours weekly). Of the surveys collected (N=31) all who participated in this study were employed full-time. All participants checked "consent to participate" on the pre- and post-education survey, implying consent to participate. For this study it was hoped for more participation but nurses' schedules are demanding, often requiring them to

work all night and odd hours. Participants were also not paid for their time as this was strictly voluntary. Conditions to improve attendance may include paying participants for their time as well as assessing the importance of in-service-education for participants.

Description of Neurological Assessment Education

Flyers were placed on nursing units as well as emailed to all eligible participants by the Neuro Education Committee. The PI of this project did not have access to participants' email or personal information. The educational intervention took place on Monday, Tuesday, Wednesday, Thursday, and Friday at 11am and 9pm to increase opportunity for participants across shifts. The education took place in the Neuro rounds room and consisted of one large table with chairs facing the projector for lecture viewing. A Neuro Education Committee member was present and Dr. Shawn Smith who introduced the principle investigator (PI) and a description of the project (Appendix F). The welcome letter (Appendix B), IRB disclaimer (Appendix C), and the Pre-Education survey (Appendix E) were distributed to participants during the first few minutes. Participants read the welcome letter and IRB disclaimer and completed the pre-education survey in approximately 10 minutes.

The PowerPoint presentation was displayed on the projector and the PI presented the PowerPoint lecture. The post-education surveys (Appendix E) were given to participants and completed in approximately five minutes. The intervention concluded with question and answer as well as discussion of the correct responses to pre- and post-education surveys. Participants were thanked for their time and participation in this study.

After completion of the neurological assessment education, pre and post-education surveys were collected and scored. 31 pre- and post-education surveys were collected. All pre-

and post-education surveys were checked for incorrect responses as well as unanswered questions. All questions were answered on pre- and post-education surveys and assigned an ID number located at the top left corner of pre- and post-education surveys.

A paired student's t-test was used to compare participants' overall score on pre- and post-education surveys (Kellar Kelvin, 2013). Prior to completing analysis, assumption testing was completed for evaluation of data for extreme outliers. Summary data are displayed using boxplots in Figure 2 and circles represent data outliers; all analyses included outlier data. They were kept in data analysis as they did not influence the mean difference, or change the conclusion of the paired-sample t-test. Testing for normal distribution of data was completed via Shapiro-Wilks test due to the small sample size (Ghasemi &, Zahediasl, 2012). The difference between the pre and post-education survey scores were normally distributed (p=.40).

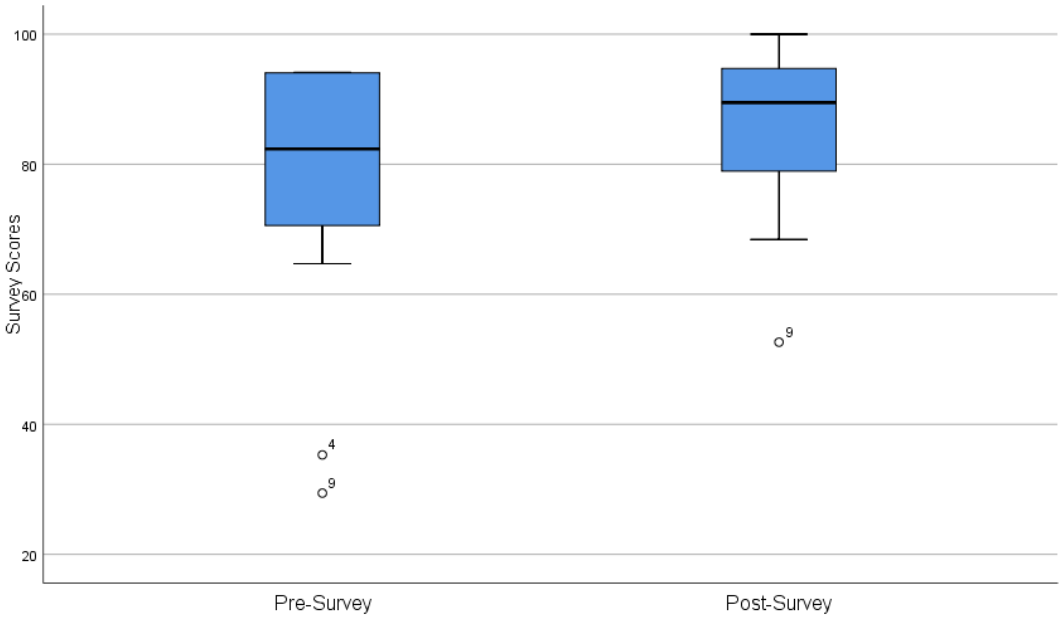


FIGURE 2. Comparison of overall score pre- and post-survey.

Participants Overall Score

The overall post-survey score was significantly higher (88.6+/-13.3) than the overall pre-survey scores (77.2+/-16.7) (p=0.001). Summarized by Table 1, participants scored 10.4 lower (95% CI, -16.2 to -4.6 points) on the pre-survey compared to the post-survey. There was greater variability in the pre-survey scores than in the post-survey scores.

TABLE 1. *Participants overall score.*

	Mean	**Standard Deviation**
Pre-Survey Final	*M=77.2*	*SD=16.7*
Post-Survey Final	*M=88.6*	*SD=13.3*

Research Question 1: Correctly identify the components of a neurological assessment?

The purpose of this study question was to evaluate if, after education participants could correctly identify components of a neurological assessment. Nine questions from the pre-survey (Q 1, 4, 5, 6, 7, 9, 12, 16, &17) and nine questions from the post-survey (Q 1, 4, 5, 6, 9, 12, 14, 16, &17) evaluated participants ability to identify neurological assessment components (Appendix E). Participants scored 11.4 points higher (95% CI, -18.5 to -.04) on the neurological assessment components in the post-survey compared to the pre-survey. Pre- (69.5+/-18.1), and post-survey (81+/-19.1), scores for neurological assessment were statistically different (P=0.002), as seen in Table 2.

TABLE 2. *Descriptive statistics and paired t-test study question 1 and 2.*

	Pre-Survey Mean +/- SD	**Post-Survey Mean +/- SD**	**Paired Sample t-test (t)**	**Significance (p=.05)**	**Conclusion**
Study Question 1: *Correctly identify the components of a neurological assessment?*	*M=69.5, SD=18.1*	*M=75.9 SD= 17.7*	*t=-3.30*	p=.002	Pre-education vs. post education survey scores were significantly different
Study Question 2: *Correctly identify normal vs. abnormal neurological findings?*	*M=85.9, SD=18.7*	*M=95.1, SD=8.9*	*t=2.32*	p=.004	Pre-education vs. post-education survey scores were significantly different

Research Question 2: Correctly identify normal vs. abnormal neurological findings?

The purpose of this study question was to evaluate if participants could correctly identify normal vs. abnormal neurological findings after an education component. Eight questions from the pre-survey (2, 3, 8, 10, 11, 13, 14, & 15) and eight questions (2, 3, 7, 8, 10, 11, 13, & 15) from the post-survey evaluated participants' ability to identify normal vs abnormal neurological findings (Appendix E). Participants scored 9.2 points higher (95% CI, -15.3 to -3.24) on the abnormal vs. normal components of the post-education survey compared to the pre-education survey. There was significant increase in scores on the normal vs. abnormal components in the post-survey (95.1+/-8.9), compared to the pre-survey (85.9+/- 18.7), (p=.004) as seen in Table 2.

Research Question 3: Perceive the education as beneficial?

The purpose of this study question was to assess participants' perception of the education (Table 3.). Regarding whether the education was beneficial (Q18), a total of 90.4% perceived the education as beneficial 58.1% at '4' and 32.3% at '5.' With respect to whether neurological assessment comprehension was increased by the educational intervention, (Q19) 32% indicated a

‘5’ and 55% indicated a ‘4,’ and 13% indicated a ‘3.’ Finally, increased confidence when performing a neurological assessment (Q20) indicated 80.7% participants choose from categories ‘4’ and ‘5.’ While, 13% indicated a category ‘3’ and 6.4% indicated category ‘1’ and ‘2.’

TABLE 3. *Perception of the neurological education (N=31).*

Question 18	***Was the lecture beneficial?***	
Rating	*Frequency*	*Percentage*
1	0	0%
2	1	3.2%
3	2	6.5%
4	18	58.1%
5	10	32.3%
Question 19	***Did your neuro assessment comprehension increase?***	
1	0	0%
2	0	0%
3	4	12.9%
4	17	54.8%
5	10	32.3%
Question 20	***Did your confidence of neuro assessment increase?***	
1	1	3.2%
2	1	3.2%
3	4	13%
4	14	45.2%
5	11	35.5%

DISCUSSION

This study was undertaken as a result of a recognized need to improve neurological nursing assessment education at IMC. The current literature indicates that nursing assessment practices and continuing education regarding those practices have not changed dramatically over the last several decades and further, many professionals do not perceive that a need for change in current practice necessary at this time (Pierce & McLaren, 2014). It may be that sustained attention regarding assessment practices, particularly neurological assessments, is needed.

Therefore, the purpose of this study was to deliver neurological assessment education to medical-surgical nurses using a face-to-face-in-service-format. Pre- and post-education surveys were obtained. Survey questions: addressed participants' ability to identify neurological nursing assessment components (SQ1); ability to identify normal vs. abnormal neurological findings (SQ2); and addressed participants' perceptions of the education (SQ3). We found that as a result of the neurological education, overall post-education survey scores were significantly increased compared to pre-survey scores. This increase was due to both the participants' ability to identify broader neurological assessment components and identify normal vs. abnormal neurological findings. Perceptions of the education were largely favorable.

Research Question 1: Correctly identify the components of a neurological assessment?

Research specifically related to study question one was not found. However, Rank (2013) discussed, in general, performing focused and comprehensive neurological assessment and the difficulty for nurses who do not routinely perform these assessments, supporting a target approach specific to a patient's status. Rank's (2013) article was not a study, rather expert opinion, supporting how to perform a focused neurologic assessment and clinical tips for nurses in how to approach a focused neurological assessment. While post-survey scores were significantly improved, the percent correct post-survey score for this aim was still only 76%. The components such as: mental status, cranial nerves, etc. may have been identified but "how to properly assess" is an area to consider adding to this education module. Including step-by-step instructions, on "how to" or adding video to the lecture may result in an even greater improvement in scores for this section of the assessment.

Research Question 2: Correctly identify normal vs. abnormal neurological findings?

Study question two evaluated participants' ability to correctly identify normal vs. abnormal neurological findings. An impetus for conducting this study was the occurrence of a sentinel event related to (difficulty/inability/inappropriate) identification of an abnormal neurological finding as well as no standardized neurological nursing assessment education is present at the facility at this time. An important finding of this study is that as a result of the education, there was a significant increase in post-survey scores vs. pre-survey scores in the ability to identify normal vs. abnormal neurological findings. The study finding implies that a one-time education that includes purposeful and focused attention to the topic of distinguishing between normal vs. abnormal neurological findings is significant, regardless of whether overall understanding of neurological assessment components was attained (Question 1). To our knowledge, prior studies that specifically assessed nurses' ability to correctly identify normal vs. abnormal neurological findings have not been conducted, making this study finding novel.

Studies describing structured patient assessments, framework assessments, and advanced skill assessments were found for emergency medical professionals, nurses, or other medical practitioners have been described. For example, an integrative review of structured patient assessments and frameworks on patient care was found, supporting the use of these by clinicians (Munroe, Curtis, Considine, & Buckleu, 2013). When using frameworks or structured patient assessments, it was found they enhanced clinician performance, although, further research is required to address gaps in evidence for using assessment frameworks, particularly in nursing (Munroe et al., 2013). Improving the assessment process through education or structured frameworks is vital for recognizing changes in patient status (normal vs. abnormal, question 2),

by enhancing this process it can have direct impact on the quality of care delivered to patients (Munroe et al., 2013).

While this study finding was significant, it is not known if the improvement in knowledge after an education event would improve clinical outcome. This idea is supported by others who believe that research should be done to link focused nursing assessments and patient outcomes (Munroe et al., 2013; Zambas, Smythe, & Koziol-Mclain, 2016). Much of nurses' time is spent with patients, contributing to their clinical outcomes however; little research has been done to identify the role of assessment skills in improving patient outcomes (Zambas et al., 2016).

Research Question 3: Perceive the education as beneficial?

The purpose of this study question was to assess participants' perception of the education. Survey questions asked if participants thought the education was beneficial, if they perceived their neuro assessment comprehension increased and whether their confidence in performing a neurological nursing assessment increased. The majority (above 80%) of participants scored in the '4' to '5' range (Likert scale 1-5, '5' being the highest) on all three questions. The addition of simulation labs is one way to incorporate continuing education into nurses' practice and many hospitals and universities already have these in place. The addition of a video or simulation into this education may complement this study and result in an increase not only in confidence, but also an increase in comprehension of the overall components and the ability to distinguish normal from abnormal findings.

Improvements

The study was undertaken due to a sentinel event and the recognized need that no standardized neurological assessment education was present at IMC. The educational lecture slides were created based on a focused neurological assessment. Lecture slides could be improved as they may not be straight forward for nurses,' lacking clarity. Increasing the quality and clarity of the educational lecture as well as adding video or simulation to the education could result in enhanced delivery of neurological education, improving nurses' knowledge specific to this assessment topic. It is essential education is effective and meets the needs of nurses' knowledge deficits. By improving the education through increased clarity and delivery, survey scores may increase as result.

Another area to consider is linking the educational lecture to electronic the electronic medical record (EMR) nurses' use in their daily practice. A "checklist" or "structured" assessment could be developed and used, based on EMR charting menus for nurses.' Linking the EMR to the education and utilizing a "how to" component may also increase nurses' knowledge and clinical skill as well as help with future developments of structured assessments or checklists for nurses to utilize.

Limitations

Several limitations for this study are present. The first limitation is the small sample size of 31 participants and all nurses from the surveys worked full-time; no part-time nurses participated. Part-time nurses often work less, which could further decrease their confidence when performing a neurological nursing assessment from lack of exposure. Second, the short duration of the study and timing of the intervention with immediate post testing does not inform

us on the long-term retention of nurses' neurological knowledge or ability to apply this knowledge in the clinical setting. Third, this study took place in one hospital and among medical surgical nurses and results cannot be generalized to other hospital units at IHC or to nurses in other hospitals. Finally, the education module itself was not formally evaluated prior to its use and it is possible that the lecture slides themselves could be improved.

Future Work and Implications for IHC

Currently there exists a paucity of research that is specific to neurological assessment among nurses. Employers often struggle to determine specialty competencies and identifying what "the right" education for nurses (Tilley, 2008). Because each physiologic system has its own unique set of nursing assessment criteria, clinical educators need to ensure that specialized nursing assessment education is being performed, and further, whether that education is meeting the knowledge and perception of knowledge deficits of the nurses (Shin, Issenberg, & Roh, 2017).

This study was undertaken due to a sentinel event and the recognized need that no standardized neurological assessment education was present at IMC. Therefore, educational lecture slides were created based on a focused neurological assessment. Important to IHC are our study findings that after the neurological assessment education, overall scores, nurses' ability to identify components of the neurological assessment and ability to identify normal from abnormal findings significantly improved and that a large percent of the nurses found the education beneficial.

Even in light of these positive findings, improvements in the education could be made. The quality and clarity of the educational lecture as well as adding video or simulation to the education could further improve nurses' knowledge specific to the neurologic assessment.

Another area to consider is linking the educational lecture to the electronic medical record (EMR) that IHC nurses use in their daily practice. A "checklist" or "structured" assessment based on EMR charting menus for nurses could be developed and used. Linking this EMR charting to the neurologic assessment education and then adding a "how to chart in the EMR" component to the education may also increase nurses' knowledge and clinical skills.

It is anticipated that future quality improvement projects/research on neurologic assessment education at IHC might include understanding how often the education should occur and whether additions of video or simulation demonstrations of the neurological assessment are effective in increasing knowledge and confidence among nurses. In addition, a study testing the effectiveness of a mentoring program where novice nurses are paired with experienced nurses when conducting neurological assessments could be implemented.

Only full time medical-surgical nurses participated in this study. Conducting a similar study for nurses in different units at IHC might be beneficial. Finally, another study could be to consider is whether the neuro assessment education is actually linked to better patient outcomes.

Relevance to DNP Essentials

Essential II: Organizations and Systems Leadership for Quality Improvement and Systems Thinking

This study aligns with DNP Essential II. Essential II regards systems leadership and quality improvement as essential components for evaluation of care delivery approaches based on scientific findings in nursing.

Essential III: Clinical Scholarship and Analytical Methods for Evidenced-Based Practice

This study aligns with DNP essential III. The completion of this doctoral research project also supports essential III in assessing practice policies and proficiency in quality improvement strategies through evaluation of current research. Development of this project, using advanced communication and skill necessary for leading quality improvement further supports alignment with essential III.

Essential VIII: Advanced Nursing Practice

Essential VIII aligns with this doctoral research project. Essential VIII supports growth of specialization in nursing practice, with no one individual mastering all advanced roles. This project developed specialty neurological education with delivery for guidance, mentoring, and supporting other nurses to achieve excellence in neurologic nursing practice.

Conclusion

The clinical nursing environment is demanding and fast paced, requiring nurses to be clinically competent and able to recognize and report changes in patient conditions. Neurologic patients present with complex chronic diseases processes, requiring nursing to be able to recognize abnormal findings during assessments. We found that after the neurological

assessment education, overall scores, nurse's ability to identify components of the neurological assessment and ability to identify normal from abnormal findings significantly improved and that a large percent of the nurses found the education beneficial. It is hoped that the results of this study will provide evidence that neurological nursing assessment education will provide bedside nurses with the clinical tools and knowledge to perform a neurological assessment confidently and accurately.

OTHER INFORMATION

Project Budget

The project budget for this DNP project was minimal. Costs included printing of the surveys.

APPENDIX A:

THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL LETTER

THE UNIVERSITY OF ARIZONA
Research, Discovery & Innovation

Human Subjects Protection Program

1618 E. Helen St.
P.O. Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home

Date:	May 30, 2018
Principal Investigator:	Candice Carter Jones
Protocol Number:	1804518571
Protocol Title:	NEUROLOGICAL NURSING ASSESSMENT EDUCATION AT INTERMOUNTAIN MEDICAL CENTER: A QUALITY IMPROVEMENT PROJECT
Determination:	Approved
Expiration Date:	May 29, 2021

Documents Reviewed Concurrently:

Data Collection Tools: *The Neurological Assessment.pptx*
HSPP Forms/Correspondence: *appendix_waiver_2-2_v2018.pdf*
HSPP Forms/Correspondence: *appendix_waiver_2-2_v2018.pdf*
HSPP Forms/Correspondence: *IHCIRBApplication.pdf*
HSPP Forms/Correspondence: *Jones list_of_research_personnel_2-3_v2018.pdf*
HSPP Forms/Correspondence: *UA IRB HR.pdf*
Informed Consent/PHI Forms: *IRBDisclaimerForm.docx*
Informed Consent/PHI Forms: *IRBDisclaimerForm.pdf*
Other: *UAIRBReferences.docx*
Other Approvals and Authorizations: *Advisor Signature.pdf*
Other Approvals and Authorizations: *COI Protocol Certification Complete.msg*
Other Approvals and Authorizations: *Confirmation for Scientific Review and Department Review.pdf*
Other Approvals and Authorizations: *IHCIRBApproval.pdf*
Participant Material: *surveys.docx*
Recruitment Material: *Candice Jones Introduction Script (1)IHC.docx*
Recruitment Material: *Flyer.docx*
Recruitment Material: *Welcome Letter.docx*

Regulatory Determinations/Comments:

- The project is not federally funded or supported and has been deemed to be no more than minimal risk.
- The project listed is required to update the HSPP on the status of the research in 3 years. A reminder notice will be sent 60 days prior to the expiration noted to submit a 'Project Update' form.

This project has been reviewed and approved by an IRB Chair or designee.

- The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).
- All research procedures should be conducted according to the approved protocol and the policies and guidance of the IRB.
- The Principal Investigator should notify the IRB immediately of any proposed changes that affect the protocol and report any unanticipated problems involving risks to participants or others. Please refer to Guidance Investigators Responsibility after IRB Approval, Reporting Local Information and Minimal Risk or Exempt Research.
- All documents referenced in this submission have been reviewed and approved. Documents are filed with the HSPP Office.

APPENDIX B:

WELCOME LETTER

Nursing Staff:

My name is Candice Jones. I am an RN and I am a graduate student at the University of Arizona's Doctorate of Nursing Practice (DNP) Program. I am conducting this quality improvement project as part of the requirements for my DNP. I am assessing medical-surgical nurses' knowledge of the neurological nursing assessment before and after delivery of a neurological assessment education. I am also assessing nurses' perceptions of the education.

The neurological system is one body system that is complex, and requires great attention to detail and mastery of complex skills by bedside nurses. Inconsistencies in neurological nursing assessment can occur due to improper training, education, or lack of clinical experience by bedside nurses. Inconsistencies affect patient outcomes. Therefore, education is imperative for neurological nursing assessments and education for nurses not working with neurological patients on a regular basis.

If you are receiving this letter then I am inviting you to participate in this project. The pre-assessment survey will take approximately 5-10 minutes to complete, the lecture is 40 minutes, and the post education survey will take approximately 5-10 minutes to complete; a total of about one hour of your time is required. Your participation is strictly voluntary and you make decline to participate or stop participation at any time. Information gathered during this study will remain confidential. Names, emails, and any identifying details will remain confidential and will not be published in the results of the study.

Thank you for taking the time to help further my research on standardization of the neurological nursing assessment education.

Sincerely,

Candice Carter Jones, MSN, RN, DNP Student
candicejones@email.arizona.edu

APPENDIX C:

DISCLAIMER FORM

NEUROLOIGCAL NURSING ASSESSMENT EDUCATION AT INTERMOUNTAIN MEDICAL CENTER

Candice Jones

The purpose of this project is to identify current nursing knowledge of the neurological nursing assessment among medical surgical nursing staff at Intermountain Medical Center, Murray Utah and to other centers.

If you choose to participate in this project, you will be asked to attend a 30-40 minute face to face lecture and complete pre-assessment and post-assessment survey questions that each take a minimum of 15-20 minutes to complete. The pre-and post-assessment surveys are completely anonymous. Your participation will take approximately 90 minutes. There are no foreseeable risks associated with participation in this research project with no incentive for participation. Participation is strictly voluntary. The information that you give in the study will be anonymous. Your name will not be collected or linked to your answers. Participation is strictly voluntary. The results of this project will help us to better understand the current needs of nurses in performing the bedside neurological assessment so that we can improve educational efforts for nurses and thereby improve patient outcomes. I hope to obtain 160 responses.

If you choose to take part in this project, you can discontinue participation at any time without penalty. You may skip questions in surveys you do not wish to answer. An Institutional Review Board responsible for human subjects research at the University of Arizona reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

If you have any questions, concerns, or complaints about the study, please contact the PI of the research at candice@email.arizona.edu.

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact the Human Subjects Protection Program at 520-626-6721 or online at http://rgw.arizona.edu/compliance/human-subjects-protection-program.

By participating in the surveys and selecting *agree* on the two surveys, you have provided your consent to allow the PI to use your responses for research purposes.

APPENDIX D:

EDUCATION MODULE

Neurological Nursing Assessment Education at Intermountain Medical Center: A quality improvement project.

Presented by Candice Jones, MSN, RN.

Candice is a DNP student at The University of Arizona and is the principle investigator of this project. This project is apart of my requirements for my DNP.

Purpose

The purpose of this quality improvement project is to deliver neurological nursing assessment education to bedside nurses at Intermountain Medical Center. The goal is to increase nurses knowledge and skills in performing neurological assessments for improved patient care.

Study Questions

1- Correctly identify normal vs. abnormal neurological findings?

2- Correctly identify neurological assessment components?

3- Perceive the education as beneficial?

Assessment Components

- Mental status
- Cranial nerves
- Motor function
- Sensation
- Coordination
- Reflexes
- Glasgow Coma Scale
- NIHSS

Mental Status

- LOC
- Orientation, follow or obey commands
- Language
  - Expressive, receptive, global aphasia
- Memory
- Attention
  - Serial 7s, WORLD backwards
- Intellectual function

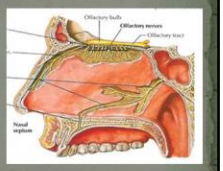
Cranial Nerves

- Purely sensory
  - Olfactory I – sense of smell
  - Optic II – sense of vision
  - Vestibulocochlear VIII – sense of hearing
- Purely motor
  - Oculomotor III – moves eyeball, constricts pupil, lifts eyelid
  - Trochlear IV – moves eyeball
  - Abducens VI – moves eyeball
  - Accessory XI – moves trapezius and sternocleidomastoid
  - Hypoglossal XII – moves tongue
- Mixed sensory and motor
  - Trigeminal V – facial skin sensation, moves muscles of mastication
  - Facial VII – senses taste, moves muscles of facial expression
  - Glossopharyngeal IX – senses taste, swallows, gags, phonation
  - Vagus X – pharynx/larynx/ear sensation, parasympathetic control to heart, respiratory system, GI tract from pharynx to transverse colon, phonation

CN I - Olfactory (sensory)

Normal exam:
Ability to differentiate smell.

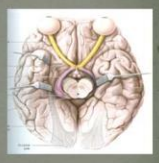
Abnormal exam:
Inability to smell or differentiate smells.



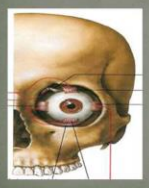
CN II – Optic (sensory)

Normal exam:
Ability to read name badge

Abnormal exam:
Decreased visual acuity or blindness.



CN III – Oculomotor (motor), CN IV – Trochlear (motor) CN VI – Abducens (motor)



Normal exam:
EOM intact.

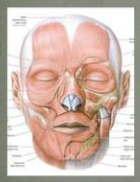
Abnormal exam:
Pupil dilation, Disconjugate gaze, double vision, weakness, or paralysis.

CN V – Trigeminal (mixed)

Normal exam:
Reports correct sensitivities to sharp or dull objects, corneal reflex.

Abnormal exam:
Impaired corneal reflex, facial numbness, jaw weakness.

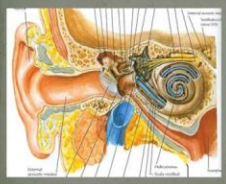
CN VII – Facial (mixed)



Normal exam:
Symmetrical facial movements, ability to discriminate between sugar or salt.

Abnormal exam:
Inability to close eyelid, facial weakness, impaired taste.

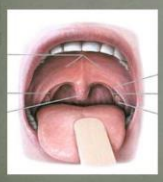
CN VIII – Vestibulocochlear (sensory)



Normal exam:
Ability to hear and balance.

Abnormal exam:
Impaired hearing, deafness, impaired balance.

CN IX – Glossopharyngeal (mixed)

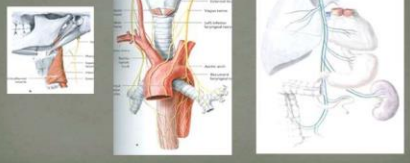


Normal exam:
Ability to swallow and discriminate between sugar & salt on posterior tongue.

Abnormal exam:
Difficulty swallowing, impaired taste.

CN X – Vagus (mixed)

- Sensation of larynx, pharynx, external ear
- Parasympathetic innervation to many visceral organs
  - Heart – slows HR
  - Respiratory system (larynx, , vocal chords, trachea, bronchii, lungs) - bronchoconstricts
  - GI tract (pharynx to transverse colon) - peristalsis

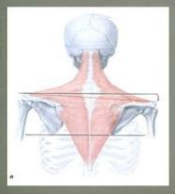


CN X – Vagus (mixed)

Normal exam:
Symmetricl rise of uvula & soft palate.

Abnormal exam:
Weak or impaired gag reflex, slurred speech (dysarthria), dysphagia.

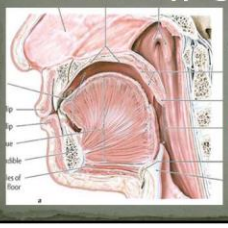
CN XI – Accessory (motor)



Normal exam:
Symmetry with should shrug. Ability to turn head with opposing pressure.

Abnormal exam:
Asymmetrical should shrug, inability to turn head to the side.

CN XII – Hypoglossal (motor)



Normal exam:
Tongue protrusion without deviation or tremor.

Abnormal exam:
Dysphagia, slurred speech.

Motor Function

- Involuntary/voluntary/purposeful mvmts
- Muscle tone: flaccid/rigid/spastic
- Strength
  - Have patient move against resistance
  - Compare sides
  - Motor strength 0 – 5 scale

Normal exam:
Symmetrical strength, coordinated movement.

Abnormal exam:
Abnormal movements, tone, or position.

Motor Strength Grading

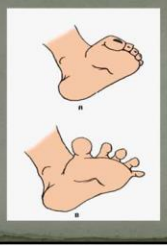
- 0/5 – No muscle movement
- 1/5 – Muscle movement visible but no movement at the joint
- 2/5 – Movement at the joint but not against gravity
- 3/5 – Movement against gravity but not against resistance
- 4/5 – Movement against resistance but less than normal
- 5/5 – Normal strength

Motor Function

- Pronator drift
- Grips

Reflexes

- 0- no response
- 1- diminished (hypoactive)
- 2- Normal
- 3- Increased (can be interpreted as normal)
- 4- Hyperactive (hyperreflexia)



Normal response

Abnormal response: POSITIVE BABINSKI

Sensation

- Test with patient's eyes closed
- Light touch
  - Same on both sides? Right, left, or both?
- Vibration
  - Tuning fork – start at distal joints
- Proprioception
  - Big toe up and down
- Pain
  - Sharp/dull
- Temperature
  - Tuning fork

Abnormal exam:
Loss of position & vibration sense. Unable to discriminate between sharp, soft, or dull.

Coordination

- Rapid alternating movements
- Point-to-point movements
- Ataxia
- Observation of gait

Abnorml exam:

Lack of symmetry, difficulty with movements.

Glasgow Coma Scale

A clinical tool used to assess patient's response to stimuli.

Score ranges from 3 (coma) to 15 (normal exam).

What are the three components?

1. eye opening
2. motor response
3. verbal response

GCS- Eye Opening

4= Spontaneous
3= To voice
2= To pain
1= None

GCS- Verbal Response

- 5= Oriented
- 4= Confused
- 3= Inappropriate words
- 2= Incomprehensible sounds
- 1= None

GCS- Motor Response

6= Obeys commands
5= Localizes pain
4= Withdraws
3= Flexion
2= Extension
1= None

NIHSS

The NIHSS is a clinical stroke assessment tool used to evaluate and document neurological status in stroke patients.

11 categories are included in this scale.

Description of patient findings are listed and a score is assigned to each category.

Conclusion & Significance

Why is this important?

What to remember?

The End

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APPENDIX E:

PRE- AND POST-EDUCATION SURVEYS

Pre-Assessment Survey

ID #

Agree to participate

YES ☐

NO ☐

How many hours do you work a week?

Full-time 36 hours a week ☐

Part-time 24 hours a week ☐

1. All of the assessment components for mental status examination include all of the following except?
   a) LOC
   b) intellectual function
   c) Romberg
   d) orientation
   e) memory

2. What is a normal examination finding when assessing cranial nerve XI?
   a) Right sided facial drooping
   b) Slurred speech
   c) Tongue protrusion
   d) Ability to shrug shoulders against resistance

3. While assessing muscle strength of your patients right arm you conclude 4/5 strength, which means the patient is able to?
   a) Move joint against but not against gravity
   b) Move muscle without joint involvement
   c) Unable to move muscle
   d) Normal strength
   e) Move muscle against resistance but less than normal

4. Motor function assessment components include all of the following except?
   a) Ability to raise eyebrows
   b) Voluntary movement
   c) Muscle strength
   d) Muscle tone

5. While assessing coordination one assessment component includes?
   a) Ataxia
   b) Rapid alternating movements

c) Touching toes
d) Eye movement upward
e) Clenching of jaw

6. Pupil reaction is part of the neurological nursing assessment. What cranial nerve assesses pupil reaction?
a) III
b) VI
c) VIII
d) IX
e) X

7. Proprioception is a part of what neurological assessment component?
a) Balance
b) Reflexes
c) Mental status
d) Sensation

8. A normal examination finding for sensation includes?
a) Two-point-discrimination
b) Loss of vibration sense
c) Anesthesia
d) Analgesia

9. Neurological assessment components you would include in your assessment include all of the following except
a) Mental status
b) Pulse rate
c) Cranial nerves
d) Motor function
e) Coordination

10. A normal neurological finding includes?
a) Asymmetry of the uvula
b) Dysphagia
c) Non-rapid alternating eye movements
d) Oriented to person, place, time, and event

11. What is level of consciousness?
a) Patient wakefulness and ability to respond to environment
b) Patient ability to count backward by seven

c) Patient use of appropriate words
d) Patient preoccupation with work

12. Mixed sensory and motor cranial nerves include?
    a) V, VII, IX, X
    b) I, II, VII, IX
    c) I, II, VII, VIII
    d) IV, VI, XI, XIII
13. A normal examination finding for cranial nerve III, IV, & VI?
    a) Intact EOM
    b) Disconjugate gaze
    c) Fixed pupils
    d) Whisper test

14. An abnormal exam finding of CN XII includes?

    a) Ability to raise eyebrows
    b) Symmetrical smile
    c) Slurred speech
    d) Positive Rinne test

15. Abnormal motor movement would be observed by?

    a) A positive drift
    b) Positive two-point-discrimination
    c) Dysphagia
    d) Distinguishes between hot and cold temperatures

16. What are the correct assessment components of NIHSS?

    a) LOC
    b) Limb ataxia
    c) Dysarthria
    d) Motor arm and leg bilaterally
    e) All of the above

17. What are the assessment components of the Glasgow Coma Scale?

    a) Eye opening
    b) Motor response
    c) Verbal response
    d) All of the above

Post-assessment survey

ID#

Agree to participate

YES ☐

NO ☐

How many hours do you work a week?

Full-time 36 hours a week ☐

Part-time 24 hours a week ☐

1. Pupil reaction is part of the neurological nursing assessment. What cranial nerve assesses pupil reaction?

a) III
b) VI
c) VIII
d) IX
e) X

2. Abnormal motor movement would be observed by?

e) A positive drift
f) Positive two-point-discrimination
g) Dysphagia
h) Distinguishes between hot and cold temperatures

3. A normal neurological finding includes?

a) Asymmetry of the uvula
b) Dysphagia
c) Non-rapid alternating eye movements
d) Oriented to person, place, time, and event

4. What are the assessment components of the Glasgow Coma Scale?

a) Eye opening
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b) Pulse rate
c) Cranial nerves
d) Motor function
e) Coordination

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a) LOC
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c) Romberg
d) orientation
e) memory

7. An abnormal exam finding of CN XII includes?

e) Ability to raise eyebrows
f) Symmetrical smile
g) Slurred speech
h) Positive Rinne test

8. A normal examination finding for cranial nerve III, IV, & VI?
e) Intact EOM
f) Disconjugate gaze
g) Fixed pupils
h) Whisper test

9. While assessing coordination one assessment component includes?
a) Ataxia
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c) Unable to move muscle
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16. What are the correct assessment components of NIHSS?

    f) LOC
    g) Limb ataxia
    h) Dysarthria
    i) Motor arm and leg bilaterally
    j) All of the above

17. Mixed sensory and motor cranial nerves include?
    a) V, VII, IX, X

b) I, II, VII, IX
c) I, II, VII, VIII
d) IV, VI, XI, XIII

Questions 18-20 please rate on a scale of one to five.

18. Did you perceive the neurological lecture as beneficial?

1 2 3 4 5

19. Did the neurological assessment lecture increase your comprehension of the neurological assessment?

1 2 3 4 5

20. Did this educational lecture increase your confidence in performing the assessment?

1 2 3 4 5

APPENDIX F:

INVITATION FLYER

The Neurological Nursing Assessment In-service Education Opportunity

Where: Neuro critical care rounds room 1
Dates and Time: TBA

The Neuro Education Committee at IMC will be holding five in-service educational lectures. All nurses are invited to attend these lectures. Lecture times are scheduled across shifts (day and night) in order to give everyone the same opportunity for attendance and participation. Lecture includes: neurological nursing assessment components, Glasgow Coma Scale, and brief NIHSS description.

An Institutional Review Board responsible for human subjects research at the University of Arizona reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Note: Candice Carter Jones, MSN, RN, will be administering pre-and post-education lecture surveys as a part of her doctoral program requirements for her DNP. Participation in educational surveys is completely anonymous and is appreciated.

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