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The effectiveness of the Concussion education program on the knowledge of nurses in the care of mild Traumatic Brain injury patients in the emergency department in the Hail Region: Saudi Arabia

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Mild traumatic brain injury (mTBI) is one of the leading causes of morbidity and mortality in both developing and developed countries, resulting disability. However, most emergency nurses lack knowledge about assessing the symptoms of mTBI and taking care of the mTBI patient. Therefore, this study aims to enhance the knowledge of emergency department (ED) nurses about concussion/mTBI through the HEADS UP Concussion Educational Program (HUCEP). A quasi-experimental one-group pretest – posttest study was conducted using a convenience sample of 180 emergency nurses working at three general hospitals in the Hail region of Saudi Arabia. The researcher employed a multiple-choice exam to assess nurses' knowledge about assessing the symptoms of mTBI for patients in the ED. The paired sample t-test was used to compare the pre - test to post-test scores. Fifty-one nurses (28%) completed the pre-test, and scores ranged from 30% to 90%, with a mean score of 61.96%. Thirty-seven percent of the nurses scored 50% or less on the pretest, 55% scored 60-80%, and 8% scored >90%. Twenty-eight nurses (15%) completed the post-test with a range of 40% to 100% and a mean score of 78.2%. Seven percent of the nurses scored 50% or less on the posttest, 57% scored 60–80%, and 36% scored >90%. There is a lack of knowledge in the ED about the nursing care of mTBI patients. ED nurses need to be familiar with symptoms and current recommendations for treatment, as well as confident in providing evidence-based patient education. The HUCEP educational program achieved its primary purpose of increasing nurses' knowledge of mTBI and trusting them with care.

Keywords: Mild traumatic brain injury, Concussion Educational Program, emergency nurses, Hail, Saudi Arabi

INTRODUCTION

Head trauma involves a wide range of different severity levels, ranging from minor head injuries to mild traumatic brain injuries. Approximately 42 million people worldwide experience a mild traumatic brain injury (MTBI) or concussion every year (Crawford, 2017). In the United States, great emphasis has been placed on traumatic brain injuries (TBIs); it is estimated that more than 1.7 million TBIs occur each year, 75% of which are concussions or other MTBIs (Asken, DeKosky, Clugston et al. 2018). MTBI is one of the leading causes of morbidity and mortality in both developing and developed countries, resulting in 11% of disability (Pankratova, Jović, & Pfeifer, 2021). In Saudi Arabia, where an incidence of 116 per 100,000 population was extrapolated (Firdaus, Theresia, Austin et al. 2021). Sandel (2020) defines concussion as “a type of TBI caused by bumping, blowing,

or shudder to the head or beating the body, producing the head and brain to move quickly back and forth”. This sudden movement can cause the brain to rebound or twist the skull, injure the brain cells, and cause chemical changes in the brain. These injuries, though often considered mild, may lead to serious physical, cognitive, and emotional impairment (Sandel, 2020).

Up to 30% of patients with a concussion diagnosis have symptoms after three months, and 15% are symptomatic one year after the head injury (Civiletti, Assenzio, Mazzeo et al. 2019). Long-term symptoms often lead to a lack of work and production and an increased cost of health care. Post-Concussion Syndrome (PCS) is a common sequela of mTBI, and it is a symptom complex that includes headache, dizziness, neuropsychiatric symptoms, and cognitive impairment (Rabinowitz & Watanabe, 2020). The costs of mTBI for each patient

were between \$33,284 and \$35,954 (Akira, Yuichi, Tomotaka et al. 2022). The effect of early mTBI education can significantly lower morbidity and healthcare costs (Yue, Upadhyayula, Avalos et al. 2020)

Despite significant improvements in knowledge of the effects of mTBI and the availability of management guidelines (Carroll, Outtrim, Forsyth et al. 2020), this knowledge has not been applied to clinical practice successfully (Gardner, Dams-O'Connor, Morrissey et al. 2018). Nurses lack knowledge of resources such as the acute concussion assessment and lack guidelines for the discharge of mTBI. As well, nurses report a dearth in their knowledge and lack of knowledge in identifying, treating, and prognosing mTBI (Anjum, Johnson Krug, & Kindsvogel, 2022).

Many persons come to the hospital after head trauma; the first focus in the emergency department (ED) is to rule out more serious injuries such as a cervical neck fracture or a brain hemorrhage, but once the patient is free of necessitating stabilization of the cervical spine, they are often discharged from the ED. Therefore, there is no specific treatment protocol for concussion; the focus shifts to managing the symptoms (Wright & Sohlberg, 2021). Numerous EDs are overcrowded; resulting in time and resource constraints, so nursing discharge education is brief and can only examine symptoms that require immediate medical attention. This practice of ED discharge leaves the patient alone to manage symptoms and, if the patient is unaware, they may carry out activities that worsen their condition (Van Gils, Stone, Welch et al. 2020). These patients often return to the ED for common symptoms of concussion that could have been managed at home if adequate teaching was provided by nursing staff at discharge (Keenan, Lovanio, Lapidus et al. 2020). Many patients have a poor understanding of concussion, yet there is a wide disparity in concussion education and suggested follow-up directions (Conaghan, Daly, Pearce et al. 2021).

The Heads-Up campaign (2015) recommends that nurses use the care plan for acute concussion evaluation (ACE), which has evidence-based discharge instructions that can be used by nurses who are discharging patients with concussion. Teaching ED nurses about concussion is vital because ED nurses play an important role in improving the health outcomes of patients through patient education (Conaghan et al. 2021). However, most ED nurses lack knowledge about assessing the symptoms of mild traumatic brain injury and taking care of the mTBI patient (Yue et al. 2020). Therefore, this study aims to enhance the knowledge of ED nurses about concussion / mTBI through the HEADS UP Concussion Educational Program (HUCEP).

MATERIALS AND METHODS

Research Question

What is the effect of HUCEP in improving the knowledge of nurses about concussion / mTBI care in the ED of the government hospitals in Hail City, Saudi Arabia?

Design, Study Sample and Setting

This study used a quasi-experimental one-group pretest – posttest. This study used a non-probability convenience sampling method. Participants are nurses working in the ED in governmental hospitals that are King Khalid Hospital, Hail General Hospital, and King Salman Specialist Hospital in Hail City, Saudi Arabia.

Sample Size

Use the statistical software G-Power version 3.1.3 with the following input parameters: paired sample t-test, alpha error probability = 0.05, power = 0.95 and effect size dz of 0.5 for two tails (Faul, Erdfelder, Buchner et al. 2009), the estimated sample size required was 180. However, a larger sample size is required to make a firm conclusion.

Inclusion and Exclusion Criteria

The inclusion criteria consisted of (a) all nurses willing to participate in the governmental hospital; (b) any ED nurse could benefit from this educational program regardless of years of experience or educational level; and (c) nurses who have been licensed by Commission for Health Specialties (SCFHS) for at least one year. The exclusion criteria were (a) nurses who were on their leave of absence at the time of data collection, and (b) nurses who did not provide direct patient care. (c) Nurses who had prior education on MTBI care and if they were knowledgeable of such resources as the CDC's "campaign practice guideline: Care of the Patient with Mild Traumatic Brain Injury."

Data Collection Procedures

Nurses attending the mandatory weekly staff meeting in the hospital after the researcher receives permission from the Continuing Education Manager join the meeting, introduce herself, and explains the study in detail for ED nurses. ED After signing informed consent, the researcher took the e-mail addresses of the nurses who agreed to participate in the study. Participants were notified via email two days prior to their next weekly staff meeting of the opportunity to participate in the research component of the educational session; their participation in the study is voluntary. Immediately prior to the educational session, the researcher introduced a hard copy of the pretest to participants. During the educational session, the researcher taught content in a clear, simple language using a lecture format. At the end of the educational session, the researcher should close the session with a summary of the main points. The hard copy of the posttest was administered one week later (next weekly staff meeting) following the educational session. Reminder e-

mails before the weekly meeting about the posttest sent two days earlier to all participants.

Ethical Considerations

The Saudi Ministry of Health Institutional Review Board approved the current study (Ref. No. 2022-62). Nurses were verbally notified that their information would be kept confidential and secure and that they were free to withdraw from the study without penalty at any time. No identifiable information was included in the pre- or post - test and the results were accessed using a computer protected by a password, with the hard copies kept in a secure digital box at the principal investigator's office.

Data Analysis

The Statistical Package for Social Science (SPSS), IBM SPSS®-PC version 28 for Windows, was used to analyze the data. For all statistical analysis, the level of significance was set at .05. Data analysis was composed of both descriptive and inferential analysis. Descriptive statistics (means, standard deviations, and percentages) were used to describe the socio-demographic characteristics of the sample. As well, the paired sample t-test was used to analyze the pre - test to post - test scores.

The HEADS UP Concussion Educational Program (HUCEP)

The HUCEP was implemented using the Foundation Logic Model developed by Kellogg (2004). The Logic Model is a framework that identifies outcomes by providing a clear map of the study before its development and anticipates ways to measure them. When the study is planned out in advance, it is less likely to stray off course inadvertently. The components of the logic model consist of resources or inputs, activities, outputs, and impacts. The HUCEP's effectiveness was evaluated using the logic model. Resources or inputs include the available human, financial, organizational, and community resources to carry out program activities. The nurses' time to participate in the program is the most important resource needed for this program. The researcher received approval and support from key stakeholders within the hospital. As well, clinical nurse manager approval and support.

The literature supports educational interventions to improve patient outcomes in the event of injury. This supports the need for a HUCEP to educate ED nurses who are able to improve patient outcomes through their discharge teaching. mTBI knowledge is measured with a multiple-choice exam based on a question computer. Questions with multiple choices were scored as correct or incorrect to yield a score of 0 percent to 100 percent. Currently, there is no measuring tool in the literature to evaluate concussion nursing knowledge. Therefore, the program developer developed this test based on two case studies to evaluate knowledge of post-concussion

symptoms, symptom evaluation, and guidelines for brain rest. The test was reviewed for validity of content and face, clarity of questions, effectiveness of instructions, and the time required for completion through peer review with Trauma Service healthcare providers, including two advanced practitioners, a trauma education specialist, an outpatient nurse, and a research coordinator, as well as two ED rehabilitation and sports medicine physicians. Five neuroscience RNs who have not participated in the study then pilot the pretest and posttest. The contents of the program are shown in Table 1.

Table 1 :HEADS UP Concussion Educational Program :1 Content

Content of Heads Up Concussion Educational Program
1. What is a concussion?
2. Common signs and symptoms
3. Concussion pathophysiology
4. Concussion prognosis
5. Concussion treatment
6. Discharge education which includes what to expect , warning signs , returning to daily activity and work and Follow up

The results are population changes resulting from the activities of a program and falling along a continuum, ranging from short-term to long-term outcomes. This program's primary outcome is to increase the knowledge of concussion and mTBI among ED nurses. A long-term outcome will be to improve the instructions for nursing discharge in the ED for patients and families with concussion. Impacts are the changes at the level of an organization, community, or system. Nurses with increased knowledge of concussions have the potential to improve the outcomes of patients with their discharge teaching, therefore improving the health status of local communities affected by concussions. Improved discharge teaching also has the potential to reduce healthcare costs by preventing unnecessary return visits to the ED.

RESULTS

The target population for this program development was nurses working in the ED at selected hospitals (n = 180) at the time of the intervention. Out of the potential sample size, 51 nurses (28%) completed the pre-test, and scores ranged from 30% to 90%, with a mean score of 61.96%. Thirty-seven percent of the nurses scored 50% or less on the pretest, 55% scored 60-80%, and 8% scored >90%.

Twenty-eight nurses (15%) completed the post-test with a range of 40% to 100% and a mean score of 78.2%. Seven percent of the nurses scored 50% or less on the posttest, 57% scored 60–80%, and 36% scored >90%.

The most improved question from pre-test to post-test was related to the mechanism of injury (Q3), which 19.61% of nurses answered correctly on pre-test and 89.29% answered correctly on post-test. Question 1 pertains to the definition of concussion and was answered correctly in 90.20% of the pretests compared to 100% on

the post-tests. Two questions were related to the diagnosis of concussion (Q2, Q4), with 66.67% to 82.35% correct on the pre-test and 92.59% to 96.43% correct on the post-test, respectively. Question 6 was related to treatment, and the scores improved from 60.78% to 89.29%; identifying symptoms (Q9) improved from 13.73% to 42.86%.

Important discharge education pertained to questions 8 and 10. The score for question number 10 improved from 64.71% to 92.86%. The scores for Question No. 8 actually decreased from 52.94% to 50%, as did the scores for defining post-concussive syndrome (Q7), which decreased from 80.39% to 66.67%.

DISCUSSION

To the best of the researcher's knowledge, this study is considered a precursor to the Saudi study of the knowledge of Saudi ED nurses in the care of mild traumatic brain injury patients. The purpose of the study is to evaluate the effectiveness of the HUCEP in improving the knowledge of nurses about concussion / mTBI care in the emergency departments of the governmental hospitals in Hail City, Saudi Arabia.

At the time of the intervention, the target population for this study was nurses working in the ED at hospitals in Hail City, Saudi Arabia ($n = 180$). The nurses completed the pre- and post-tests to evaluate HUCEP's effectiveness in improving nurses' knowledge of concussion / mTBI care in the ED. A concussion or mTBI is the most prevalent form of TBI and accounts for 75% of people with head trauma who go to the ED.

mTBI can lead to significant cognitive impairments, psychiatric illness, and increased suicide rates. The presence of cognitive deficits in the first 2 weeks after a mTBI and complete recovery may take 6 months or a year. However, for some individuals, recovery may take just two weeks (Kara, Crosswell, Forch et al. 2020). In terms of the risk of psychiatric illness after mTBI, Ponsford, Alway and Gould (2018) stated that the prevalence of psychiatric illness increased in the first year and that risk continued through the first 2 years after injury. In consistency with this finding, a study by Albrecht, Barbour, Abariga et al. (2019) stated that there was an increased risk of major depression within 5 years of MTBI; the risk was highest in the first year. As well, a study by Teasdale and Engberg (2001) investigated post-MTBI suicide rates. The study revealed a threefold higher risk of suicide among patients with mild traumatic brain injury than the general population. The current study therefore uses HUCEP to improve the knowledge of nurses who may decrease cognitive impairments, psychiatric diseases, and suicidal rates among patients post-mTBI.

There is strong evidence that earlier intervention may reduce long-term symptoms (Thastum, Rask, Naess-Schmidt et al. 2018). In particular, early educational interventions in diagnosed cases, such as expectation management, have been shown to be effective in reducing

symptoms of long-term mTBI. Many literature review studies recommend educational intervention in a timely manner to ensure the best outcomes for mTBI patients (Araki, Yokota, & Morita, 2017; Polinder, Cnossen, Real et al. 2018). On the other hand, there was a greater decline in nurses' knowledge levels after a 3-month period than immediately after the program's implementation. This points to a gradual decrease in nurses' knowledge by implementing the post-program time (Rytter, Westenbaek, Henriksen et al. 2019; Shehab, Ibrahim, & Abd-Elkader, 2018).

Because ED nurses are the frontline care providers for most patients, knowledge of mTBI patients' assessment, treatment, and education should be an important skill of ED nurses to support best patient outcomes. Despite the importance of this knowledge, the level of knowledge of nurses was very low. Therefore, this study used HUCEP to improve the knowledge of ED nurses to provide patients with the best outcomes.

Limitations

This research has a number of limitations. To begin, this study used a convenience sample, which may or may not be representative of all nurses. The second issue is the limited sample size and single-group pretest-posttest design. Because of the small sample size, demographic characteristics were evaluated to limit the sample's analysis and interpretation. Third, this research was done at governmental hospitals, with a chosen sample of ED nurses participating. As a result, the results may not be representative of all ED nurses who care for mTBI patients or work in private or military hospitals.

Implications for Nursing Practice

Based on the results of the study, future programs should adopt a hands-on or more in-depth problem-based learning approach to empower nurses to incorporate content into practice. Additionally, further research is recommended to evaluate teaching methods and curriculum content that are most effective in educating ED nurses who care for mTBI patients and recognize obstacles to incorporating this knowledge into practice.

Advanced nursing practitioners (ANP) have the opportunity to identify a dearth of knowledge in clinical practice in all health care settings. Educational needs evaluation can effectively motivate changes in teaching policies to enhance the understanding of nurses in ED. The ANP is able to stimulate change through the development of an educational program with nursing staff that empowers nurses to deliver more competent and evidence-based patient care to improve patient outcomes.

CONCLUSION

The findings of the reviewed studies show that there is a lack of knowledge in the ED about the nursing care of mTBI patients. ED nurses need to be familiar with symptoms and current recommendations for treatment, as

well as confident in providing evidence-based patient education. Effective education programs are essential for delivering this information and promoting day-to-day practice implementation. Overall, this educational program (HUCEP) achieved its primary purpose of increasing nurses' knowledge of mTBI and trusting them with care.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

The following authors confirm their contribution to the paper: conceptualization: T. A. Methodology of study: all authors. Formal analysis: T. A. Original Writing T.A. Manuscript Preparation: T. A.

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