CHAPTER III
FINDINGS

This study was conducted to synthesize the knowledge on posttraumatic headache management in mild traumatic brain injury patients. Before the analysis and synthesis, the related evidence was obtained and subsequently evaluated to determine its quality or level of the evidence before inclusion in the present study. Consideration was made by setting the criteria to select the literature which included the following topics: assessment, management, treatment, intervention, and therapy in order to acquire proper knowledge on posttraumatic headache management in mild traumatic brain injury patients to ensure comprehensive coverage.

3.1 Findings of the evidence-based inquiry

The investigator obtained a total of 52 pieces of evidence that met the previously set inclusion criteria and read the content details in order to select only pieces of evidence that was as closely corresponding to the topic of the study as possible. In the end, the investigator selected 17 pieces of evidence and excluded 35 pieces of evidence because these 35 pieces of evidence were studies that had been conducted to investigate the effects of therapy and medications to treat abnormal headaches not specific to acute posttraumatic headaches, as shown in Figure 3.1 below.

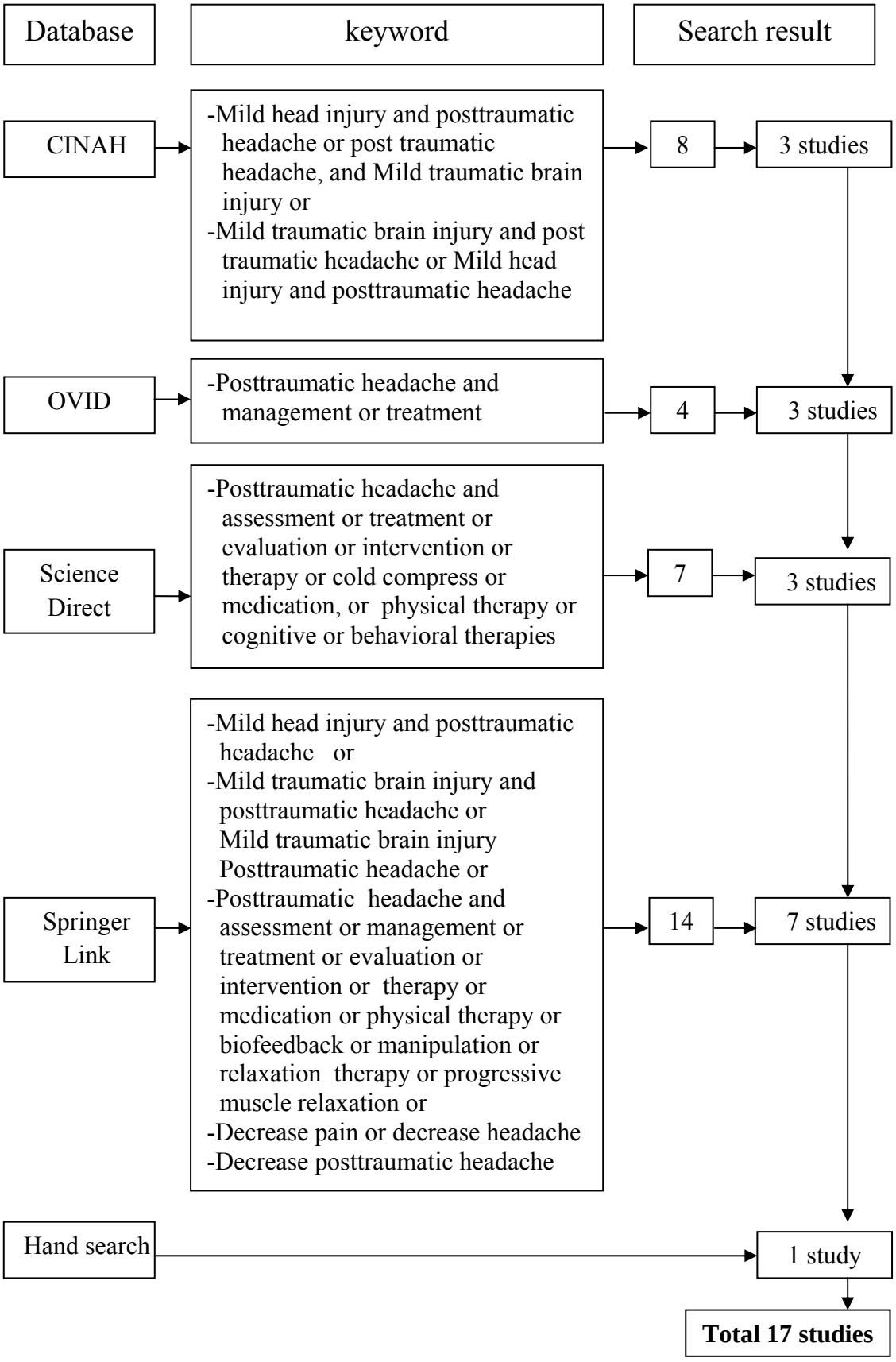

Figure 3.1: Findings of the Evidence-Based Inquiry

3.2 Evaluating the Quality of the Evidence

Of the selected 17 pieces of evidence, one pieces of evidence was retrieved from a systematic review of intervention (Level 4), one piece of evidence was from a systematic review of observational studies (Level 4), one piece of evidence was from a prospective controlled study (Level 5), one piece of evidence was from a Cross-sectional correlational design (Level 6), and 13 articles were from unsystematic clinical observations comprising evidence containing general studies with wide scopes from observations without systematic literature reviews, or professional or expert opinions in specific professional groups in the care and treatment of patients in description (Level 7). The selected pieces of evidence were then evaluated to determine their quality by using the evaluation framework of DiCenso, Guyatt, and Ciliska (2005) covering three aspects, i.e. whether the finding were accurate, what the findings were, and whether or not the findings were suitable for implementation, as shown in Table 3.2 which summarizes and evaluates the quality of the selected evidence.

Table 3.1: Summary and Classification of the Levels of the Findings

No.	Database	Author/Title/Publishing Source	Research Design	Level
1.	Science Direct	Watanabe, T. K., Bell, K. R. Walker, W. C. & Schomer, K. (2012). Systematic review of interventions for post-traumatic headache. Journal of American Academy of Physical Medicine and Rehabilitation, 129-140.	Systematic review of interventions	4
2.	OVID	Lew, L. H. et al. (2006). Characteristics and treatment of headache after traumatic brain injury. American Journal of Physical Medicine & Rehabilitation, 619-627.	Systematic review of observational studies	4
3.	CINAHL	Faux, S., & Sheedy, J. (2008). A prospective controlled study on the prevalence of posttraumatic headache following mild traumatic brain injury. Journal of Pain Medicine, 9(8), 1001-1011.	Prospective controlled study	5
4.	Thai Journal of Nursing Council	Intira Ta-aue (2009). Relationship between symptoms of posttraumatic headaches and functional status in mild traumatic brain injury patients Thai Journal of Nursing Council, 25(2), 43-53.	Cross-sectional correlational design	6
5.	OVID	Erickson, J. C., Neely, E. T. & Theeler, B. J. (2010). Posttraumatic headache. Journal of American Academy of Neurology, 55-77.	Unsystematic clinical observations	7

Table 3.1: Summary and Classification of the Levels of the Findings (cont.)

No.	Database	Author/Title/Publishing Source	Research Design	Level
6.	Springer Link	Erickson, J. C. & Theeler, B. J. (2012). Posttraumatic headache. Journal of Traumatic Brain Injury: A Clinician's Guide to Diagnosis, Management, and Rehabilitation, 55-72.	Unsystematic clinical observations	7
7.	Springer Link	Formisano, R., Bivona, U., Catani, S., D'Ippolito, M., & Buzzi, M. G. (2009). Post-traumatic headache: fact and doubts. Journal of Headache Pain, 10, 145-152.	Unsystematic clinical observations	7
8.	CINAHL	Gladstone, J. (2009). From psychoneurosis to ICHD-2: An overview of the state of the art in post-traumatic headache. Journal of Current Review: Clinical Science, 1097-1111.	Unsystematic clinical observations	7
9.	Springer Link	Lanaerts, M. E. & Couch, J. R. (2004). Posttraumatic headache. Journal of Current treatment options in neurology, 6, 507-517.	Unsystematic clinical observations	7
10.	Springer Link	Lane, J. C. & Arciniegas, D. B. (2002). Post-traumatic headache. Current Treatment Options in Neurology, 4: 89-104.	Unsystematic clinical observations	7

Table 3.1: Summary and Classification of the Levels of the Findings (cont.)

No.	Database	Author/Title/Publishing Source	Research Design	Level
11.	Springer Link	Linder, S. L. (2007). Post-traumatic Headache. Journal of Current Pain and Headache Report, 11, 396-400.	Unsystematic clinical observations	7
12.	Science Direct	Lucas, S. (2011). Headache management in concussion and mild traumatic brain injury. Journal of American Academy of Physical Medicine and Rehabilitation, S406-S411.	Unsystematic clinical observations	7
13.	Science Direct	Mcgeeney, B. E. (2009). Secondary headache: concepts and examples. Techniques in Regional Anesthesia and Pain Management, 13, 58-64.	Unsystematic clinical observations	7
14.	CINAHL	Obermann, M., Keidel, M., & Diener, H. C. (2010). Post-traumatic headache: Is it for real? Crossfire debate on headache: Pro. Journal of Current Review: Clinical Science, 710-715.	Unsystematic clinical observations	7
15.	Springer Link	Packard, R. C. (2008). Chronic Post-traumatic headache: Associations with mild traumatic brain injury, concussion, and post-concussive disorder. Journal of Current pain and Headache Report, 12, 67-73.	Unsystematic clinical observations	7

Table 3.1: Summary and Classification of the Levels of the Findings (cont.)

No.	Database	Author/Title/Publishing Source	Research Design	Level
16.	Springer Link	Seifert, T. D. & Evans, R. W. (2010). Posttraumatic headache: A Review. Journal of Current pain and headache report, 14, 292-298.	Unsystematic clinical observations	7
17.	Ovid	Vargas, B. B. & Dodick, D. W. (2012). Posttraumatic headache. Journal of Current Opin Neural report, 25, 284-289.	Unsystematic clinical observations	7

The search for evidence resulted in 17 pieces of evidence which were then evaluated for implementation feasibility as recommendations for posttraumatic headache management in mild traumatic brain injury patients based on the evaluation criteria of DiCenso, Guyatt, and Rinnie (2005) by means of which the following three topics were evaluated:

1. Are the results valid?

The evaluation of the validity of systematic review of interventions the study was conducted with the clear objective of reviewing the literature. The procedures for systematically finding articles in concurrence with the objective; clear, suitable inclusion and exclusion criteria were set, the criteria for evaluating the articles collected were stated and the information from each of the articles was inadequately stated. The evaluation of the validity of the prospective controlled study showed that the research was reliable because it was a prospective cohort study with a control group for comparison, thereby making the research findings have a higher degree of reliability. The research question was clear with a clear setting of the population studied, namely, the group of mild traumatic brain injury patients. The sample group was properly obtained, i.e. inclusion-exclusion criteria were clearly set with the use of valid and reliable instrumentation in measurement and the measurement methods were the same for the sample and control groups, and the follow-up study on the sample group was complete and sufficient. Moreover, the evaluation of the

validity of the systematic review of observational studies found validity with the issue to be studied, namely headaches following head trauma. However, the research findings did not clearly identify the population. The research was conducted with clearly set objectives and the systematic review of observational studies model was appropriate. The procedures for the systematic search for related studies were carried out with clearly set criteria for selection and exclusion. Furthermore, the evaluation of the validity of the studies that were the consensus of physician-experts in specific fields revealed that the research findings were valid for the issue under study, namely posttraumatic headaches in mild traumatic brain injury patients. Most of the content, however, did not clearly identify the population, but it mentioned treatment for headaches following traumatic brain injury without stating specific patient groups for the treatments. In summary, the findings from all 17 pieces of evidence were found to be valid for the clinical problem of the study, i.e. guidelines for posttraumatic headache management in mild traumatic brain injury patients.

2. What are the results?

All of the 17 pieces of evidence comprised research on posttraumatic headaches in mild traumatic brain injury patients, and most of the research findings obtained offered guidelines for both pharmacological and non-pharmacological headache management, assessment of headache symptoms in mild traumatic brain injury patients, monitoring conditions/symptoms, and providing knowledge. All of the research findings submitted to analysis and synthesis comprised the prospective controlled study, which found the overall evaluation of the study to be suitable. The systematic review of observational studies, research involving the compilation of similarities from each study, and the summary of the research findings had sufficient clarity and were valid for the topic to be studied, namely posttraumatic headache in mild traumatic brain injury patients.

3. How can I apply the results to patient care?

The research findings can be applied to the care of patients because they belong to the sample population group, namely, mild traumatic brain injury patients. The findings are concurrent with the clinical problem studied in posttraumatic headache management for mild traumatic brain injury patients. Guidelines were obtained for posttraumatic headaches

management in mild traumatic brain injury patients on the following four topics: assessment, management, monitoring symptoms, and providing knowledge. The findings are feasible for implementation in a real situation or an actual healthcare setting with no harm to patients and can be developed for the context of nurses involved in posttraumatic headache management in mild traumatic brain injury patients and the care of this patient group. Nurses can use the findings as practice guidelines in combination with multi-disciplinary teams in order to help patients receive proper management and care. In addition, the guidelines are not complicated and no special instruments or equipment is required for implementation. However, nursing workloads might require consideration. More importantly, the implementation will not put patients at any risk. Patients will be safe and receive nursing care with greater quality than practice according to the former model, while increasing nursing care quality.

Of the 52 research studies retrieved, 17 were selected and evaluated to determine their quality using the evaluation criteria proposed by DiCenso, Guyatt, & Ciliska (2005) by raising the following questions:

1. Are the results valid? Are the results matched the clinical problem of interest and the target group? Can the results be used to manage headaches in patients with mild traumatic brain injuries?

2. What are the results? The study findings revealed that management of posttraumatic headaches could be divided into pharmacological management and non-pharmacological management, which could be summarized in four points: 1) assessment, 2) management, 3) monitoring, and 4) education.

3. How can I apply the results to patient care? The study findings were appropriate for implementation to manage posttraumatic headaches in patients with mild traumatic brain injuries.

3.3 Synthesis of Evidence

The results of the analysis and synthesis as well as determination of reliability which were done by considering these three aspects are presented as a summary table with the following details. Table 3.3: Collective Table

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.	Watanabe, T. K., Bell, K. R. Walker, W. C. & Schomer, K. (2012). Systematic review of interventions for post-traumatic headache.	Sample size Adult and child samples with mild, moderate, or severe traumatic brain injury, whiplash, and post-concussion syndrome (n=611) Duration of data collection Published since 1985-2009 PubMed, CINAHL, PsycINFO, Proquest, Web of Science, and Google Scholar	Objective 1.Determination of effective interventions for post traumatic headache. 2.Development of treatment recommendation. 3.Identification of gaps in the current medical literature regarding post traumatic headache treatment. 4.suggestions for future directions in research to improve outcome for person with post traumatic headache.	Results The 36 articles that met the criteria for inclusion in the review. The current review identified 9 articles that used pharmacotherapy for posttraumatic headache. The range of medications used included sumatriptan, intravenous ergotamine and metoclopramide, topical ketoprofen, indomethacin, valproic acid, amitriptyline, and propranolol. Biologically based interventions included a variety of biofeedback mechanisms, physical therapy and manual therapy, immobilization devices, ice, and injections. Behavioral interventions were cognitive behavioral therapy, relaxation techniques, biofeedback, and education. Suggested treatment algorithms acute headache after traumatic brain injury:	The findings can be applied to care for patients because the sample group matched the population of interest used to compare and consider whether or not patients have received medications for posttraumatic headaches included sumatriptan, intravenous ergotamine and metoclopramide, topical ketoprofen, indomethacin, valproic acid, amitriptyline, and propranolol. And can be applied to the care of patients by using biologically based interventions included a variety of biofeedback mechanisms, physical therapy and manual therapy, immobilization devices, ice, and injections. Behavioral interventions were cognitive behavioral therapy, relaxation techniques,

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.		Setting The University of Washington Model Systems Knowledge Translation Center. Inclusion criteria Included articles in which treatment of headache after traumatic brain injury was a primary or secondary outcome of the study. Exclusion criteria When a study did not meet these criteria, the article was excluded from	Methodology Systematic review of intervention Research tools SF-36 physical and mental scores, pain VAS, activity sleep	1. Consider performing a workup for intracranial abnormality base on accompanying signs and symptoms 2. Categorize headache typology. 3. For severe (functionally limiting) acute posttraumatic headache of any typology, consider use of time limited opioids. 4. For mild to moderate posttraumatic headache of any typology including tension-type headache, consider a trial of acetaminophen and/or nonsteroidal anti-inflammatory drugs, also time limited. 5. Treat associated comorbidities. 6. For headaches that meet the criteria for migraine, initiate a trial of abortive medication (ie, triptans). 7. For headaches associated with cervical spine pain, begin with	biofeedback, and education. And can be applied to algorithms acute headache after traumatic brain injury. And research result can be applied to the care of patients by using diagnostic criteria for type of headache and consider whether or not patients have received the right medications for each type of headaches.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.		further review.		gentle mobilization. Type of headache and Diagnostic criteria Migraine without aura A. At least 5 attacks fulfilling criteria B-D B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated) C. Headache has at least 2 of the following characteristics: Unilateral location Pulsating quality Moderate or severe pain intensity Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs) D. During headache at least one of the following: Nausea and/or vomiting Photophobia and phonophobia E. Not attributed to another	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.				disorder Migraine with aura A. At least 2 attacks fulfilling criteria B-D B. Aura consisting of at least 1of the following but no moter weakness: Fully reversible visual symptoms, including positive features (eg, flickering lights, spots, or lines) and/or negative features (ie, loss of vision) Fully reversible sensory symptoms including positive features (ie, pain and needles) And/or negative features (ie, numbness) Fully reversible dysphasic speech disturbance C. At least 2 of the following: Homonymous visual symptoms and/or unilateral sensory symptoms At least one aura symptom	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.				develops gradually over ≥ 5 minutes and/or different aura symptoms occur in succession over ≥ 5 minutes Each symptom lasts ≥5 minutes and ≤ 60 minutes D. Headache fulfilling criteria B-D above for migraine without aura begins during the aura or follows aura within 60 minutes E. Not attributed to another disorder <u>Probable migraine (with or without aura)</u> Fulfills all but one of the criteria (A-D) previously listed for migraine headaches A. At least 10 episodes occurring on < 1 day/month on average (< 12 day/year) and fulfilling criteria B-D B. Headache lasting from 30 minutes to 7 days C. Headache has at least 2 of the	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.				following characteristics: Bilateral location Pressing and/or tightening (nonpulsating) quality Mild or moderate intensity Not aggravated by routine physical activity such walking or climbing stairs D. Both of the following: No nausea or vomiting (anorexia may occur) No more than one of photophobia or phonophobia E. Not attributed to another disorder Frequent episodic tension type At least 10 episodes occurring on ≥ 1 but < 15 day/month for at least 3 months (≥ 12 < 180 day/year) and fulfilling criteria B-E (as above for infrequent episodic tension-type headaches) Acute posttraumatic headache Develops with 7 day of injury,	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.				persists ≤ 3 months Cervicogenic headache A. Pain, referred from a source in the neck and perceived in one or more regions of the head and/or face, fulfilling criteria C and D B. Clinical, laboratory, and/or imaging evidence of a disorder or lesion within the cervical spine or soft tissues of the neck known to be or generally accepted as a valid cause of headache C. Evidence that the pain can be attributed to the neck disorder or lesion based on at least one of the following: Demonstration of clinical signs that implicate a source of pain in the neck abolition of headache after diagnostic blockade of a cervical structure or its nerve supply by using placebo or other adequate controls D. Pain resolves within 3 months	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
1.				after successful treatment of the causative disorder or lesion	
2.	Lew, L. H. et al. (2006). Characteristics and Treatment of Headache after Traumatic Brain injury.	Sample size (n=423) Duration of data collection From 1990-2005. Setting MEDLINE Inclusion criteria The literature search was limited to the English language and human studies and adult patient. Exclusion criteria Articles related to pediatric populations were excluded.	Objective Synthesize recent medical literature on Posttraumatic headache. Methodology systematic review of observational studies. Research tools Not specified	Results The diagnostic criteria for acute posttraumatic headache attributed to mild head injury was as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 No loss or loss of consciousness for < 30 minutes. 2.2 GCS ≥ 13. 2.3 Diagnostic symptoms and/or signs of concussions 3. Headache develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma4.2 Headache persists but 3 months have not yet passed since trauma	The findings can be applied to care for patients because the sample group matched the population of interest. The posttraumatic headache evaluation criteria in patients with mild traumatic brain injury can be used to evaluate patients and the findings can be used to compare and consider whether or not patients have received the right medications for each type of headaches. Treatment for acute tension and migraine headaches should involve simple analgesics and non-steroidal anti-inflammatory medications. Treatment for tension-type headaches should involve antidepressants and muscle relaxants. Prevention of migraine headaches should

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
2.				The treatment of posttraumatic headaches comprised pharmacological treatments and non-pharmacological treatments. -Treatments for acute tension-type and migraine headaches involve simple analgesics and non-steroidal anti-inflammatory medications. -Medications used to prevent migraine headaches including calcium channel blockers, anticonvulsants, antidepressants, and beta-blockers. -Medications used to treat tension-type headaches included antidepressants and muscle relaxants. -Medications used to treat acute migraine included ergotamine, dihydroergotamine, and the triptans.	involve calcium channel blockers, anticonvulsants, antidepressants, and beta blockers. Medications used to treat acute migraine included ergotamine, dihydroergotamine, and the triptans. Recommendations for treatment alternatives are composed of physical therapy, manipulation, and psychological and behavioral management. Psychologic evaluation and behavior therapy, as well as lifestyle change and avoidance of medication overuse, are also important in management of posttraumatic headache.

Table 3.3 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
2.				- Specific alternative treatments for posttraumatic headache included physical therapy, manipulation, psychological and behavioral management. - Psychologic evaluation and behavior therapy, as well as lifestyle change and avoidance of medication overuse, are also important in management of posttraumatic headache. The mainstay of treatment is to prevent chronicity by using prophylactic medications, to adequately control the use of multiple medications in the acute stage, as well as to diminish the risks of the rebound phenomenon induced by medication overuse.	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
3.	Faux, S. & Sheedy, J. (2008). A Prospective Controlled Study on the Prevalence of Posttraumatic Headaches Following Mild Traumatic Brain Injury.	Sample size Experimental group comprised 100 patients diagnosed with mild traumatic injuries and the control group comprised 100 minor bone injury patients. Duration of data collection 2004 Setting Emergency Department in of St Vincent's Hospital, Sydney, Australia Inclusion criteria 1. Seventeen years or over	Objective To establish the prevalence of posttraumatic headache, persisting at 3 months Methodology Prospective Controlled Study Research tools 1. Visual analog scores of pain (rang 0-10). 2. The Rivermead Post concussion Symptoms Questoinnaire. 3. lion 300 Alcometer 4.Galveston Orientation and Amnesia Test and the modified Westmead Post	Results The incidence of headaches in mild traumatic brain injury patients at 1 month was found to be 30.4% as compared to 2.12% in the control group and at 3 months was found to be 15.35% as compared to 2.25% in the control group ($p \leq 0.001$).	The findings can be implemented in care for patients because the population group comprised mild traumatic brain injury patients. The Visual Analog Scores of Pain (VAS) with scores ranging from 0 to 10 points was used to assess the headaches of mild traumatic brain injury patients, with 0 points indicating no pain while 10 points indicating maximum pain, thereby enabling nurses to know the level of pain of each patient and provide care to ensure proper pain management given to patients. Implementation of the Visual Analog Scores of Pain (VAS) did not increase the burdens for users, but it created benefits for patients and did not increase expenses. Posttraumatic headache symptoms in patients

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
3.		2. Fluent English speaker. 3. GCS 13-15 in ED. 4. A negative head CT scan (no intracranial pathology). 5. Any of the following indicators of concussion: loss of balance, altered consciousness, retrograde or anterograde amnesia, disorientation, confusion, vomiting nausea, blurred vision or headache.	Traumatic Amnesia Scale, and neurocognitive functioning; the modified Rapid Screen of Concussion.		with mild traumatic injuries should be monitored at 1 and 3 months posttrauma because headaches can be encountered during these periods of time.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
3.		Exclusion criteria 1. GCS < 13 in ED. 2. Positive head or cervical spine CT scan. 3. Any new or old intracranial pathology. 4.Skull fracture 5. Concurrent injuries with Abbreviated Injury Score equal to or below two. 6. Hearing disorder preluding completion of assessment.			

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
4.	Intira Ta-ue, (2009). The Relationships between Post Concussion Syndrome and Functional Status in Patients with Mild Traumatic Brain Injury.	Sample size 88 patients with mild head injury Duration of data collection Not specified Setting Patients with mild head injury aged 18 years old and older, both males and females, who received follow-up treatment at the neurological clinic of 3 tertiary hospitals in the central region. Inclusion criteria 1) The Glasgow coma scale (GCS) score, which was used to assess	Objective To investigate the relationship between symptoms of posttraumatic headaches and functional status in mild traumatic brain injury patients. Methodology Cross-sectional correlational design Research tools 1. The instrument used to screen the sample was Karnofsky Performance Status Scale (KPSS). The instruments used to collect data consisted of:	Results Almost two-thirds of the study subjects (64.8%) were male, while 35.2% were female. They ranged in age from 18 to 35 years old, with the mean age of 36.77 years (SD = 15.53), or in the working age group. As regards causes of mild traumatic brain injury, 70% were injured in a traffic accident. After mild traumatic brain injury was treated, almost three quarters (72.7%) suffered from memory loss. Half of the subjects lost consciousness after the traumatic brain injury, and the largest group lost their consciousness for 30 minutes. The majority of subjects had Glasgow scores both at hospital admission and at hospital discharge at a normal level of 15 points, making up 85.2% and 97.7%, respectively.	The study findings could be applied to manage headache in mild traumatic brain injury patients because the study sample was similar to the population of interest when mild traumatic brain injury patients suffered from symptoms of posttraumatic headaches such as headache, dizziness, memory loss, and fatigue. The patients may suffer from only one symptom or multiple symptoms simultaneously. The severity of symptoms affects patients' psychosocial and physical functional status. Medical personnel should offer advice to ensure patients' and caregivers' readiness to cope with such symptoms that may occur at home after hospital discharge. Nursing care plans

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
4.		levels of consciousness, was equal to 13 to 15 points at hospital admission and discharge. 2) During hospitalization, the Glasgow score was equal to or higher than 13 points. 3) They came to the first follow-up examination two weeks after hospital discharge (seven to 14 days). Exclusion criteria 1) History of brain surgery before and during	**Part 1:** The demographic characteristics questionnaire developed by the researcher and consisting of eight items. **Part II:** The traumatic brain injury record form constructed by the researcher consisting of nine items. **Part III:** The Rivermead Post Concussion Symptoms Questionnaire (RPQ). **Part IV:** The Sickness Impact Profile (SIP).	It was also found that 73 out of the 88 mild traumatic brain injury patients had posttraumatic headaches symptoms, accounting for 83%. The mean score of severity of posttraumatic headaches of the subjects was 9.99 points (SD = 8.49). It was found that physical symptoms were at a severe level, followed by emotional behavioral symptoms, cognitive symptoms, and vision-related symptoms. After hospital discharge, the mean score of overall functional status of mild traumatic brain injury patients at two weeks after hospital discharge was equal to 10.17 points (SD = 9.05). Problems with psychosocial functioning ranked first, followed by physical functioning. As for general functioning, the most	should also be devised to effectively promote patients' recovery from such symptoms. Continuous and consistent monitoring and coordination are also required.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
4.		the current hospital admission. 2) History of mental and psychiatric illnesses. 3) History of neurological illnesses. 4) Injury of other organs that affected functioning and body movements. 5) The Karnofsky Performance Status Scale scores indicating self-care ability lower than 70 points.		problematic aspect was work related activities, followed by recreational and leisure activities and household management, respectively. Severity of posttraumatic headaches was positively related to overall functional status, physical functional status, and psychosocial functional status at a moderate level ($r = 0.597$, $r = 0.324$, and $r = 0.697$, respectively, $p < 0.01$). Severity of cognitive symptoms was associated with overall functional status, physical functional status, and psychosocial functional status at a moderate level ($r = 0.520$, $r = 0.320$, and $r = 0.644$, respectively, $p < 0.01$). Finally, severity of emotional behavioral symptoms was positively related to overall functional status and physical functional status at a moderate level ($r = 0.607$ and $r = 0.321$,	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
4.				respectively, $p < 0.01$), while severity of emotional behavioral symptoms was positively related to psychosocial functional status at a high level ($r = 0.715$, $p < 0.01$).	
5.	Erickson, J. C., Neely, E. T., & Theeler, B. J. (2010). Posttraumatic Headache.	Sample size (n=1670) Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective This article reviews the classification, epidemiology, prognosis, and pathophysiology of headaches after traumatic brain injury and provides a practical clinical approach for evaluating and treating patients with posttraumatic headaches. Methodology Unsystematic clinical observations.	Results The major goals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. This information is essential to formulating an effective therapeutic care. A detailed description of the headache should be obtained, including onset, location, quality, frequency, severity, duration, associated symptoms, triggers,	The findings are suitable for implementation in planning and management of posttraumatic headaches. The population had characteristics similar to the group studied, and the findings can be applied in planning and care for posttraumatic headache patients to ensure that patients receive correct and proper management and care for posttraumatic headaches. The major goals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.			Research tools Not specified	functional impact, and changes in pattern over time. The specific characteristics of posttraumatic headaches can be used to classify them into categories that have treatment implications. Patients with headaches should undergo a careful neurologic examination, including vital signs and evaluation of mental status, cranial nerves, motor function, sensation, coordination, gait, and reflexes. Most patients with headaches in the subacute phase after concussion or mild head injury should have a normal neurologic examination. Head CT or MRI has been recommended in patients whose headache worsen or persist longer than one week after concussion. NSAIDs are a good first choice for most types of posttraumatic headaches. NSAIDs	on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. A detailed description of the headache should be obtained, including onset, location, quality, frequency, severity, duration, associated symptoms, triggers, functional impact, and changes in pattern over time. And research result can be applied to the care of patients consider whether or not patients have received the right medications for each type of headaches. All patient with posttraumatic headaches education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.				are effective for migraine, tension-type headache, and cervicogenic headache. The triptan class of medications should be tried in patients with migraine-type posttraumatic headaches that fail to respond adequately to NSAIDs. Patients who experience nausea or vomiting during acute migraine attacks should be prescribed an antiemetic agent, such as metoclopramide, prochlorperazine, or promethazine. Triptan agents may be given incombination with an NSAID for increased effectiveness. A variety of combination analgesic products are marketed for acute treatment of headache. Such products include butalbital/ acetaminophen/caffeine (Fioricet),	Lifestyle modification. Recommendations for treatment alternatives are composed cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenic headache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. And can be applied to the care of patients by using standardized instruments

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.				butalbital/ aspirin/ caffeine (Fiorinal), acetaminophen/isometheptene/dichloralphenazone (Midrin), and acetaminophen/aspirin/ caffeine (Excedrin). These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache. Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines and are first-line options for prevention of posttraumatic migraine headaches. Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache.	can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test (HIT-6) and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.				Nonpharmacologic therapies include behavioral therapies, physical modalities, and injection procedures. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yet often overlooked, technique. Patients should be encouraged to establish healthy meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. Specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches.	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.				Cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenic headache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. Standardized instruments can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
5.				guide patient care.The Headache Impact Test (HIT-6) and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.	
6.	Erickson, J. C. & Theeler, B. J. (2012). Posttraumatic Headache.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective The classification, epidemiology, clinical features, and diagnosis of Posttraumatic headaches and provides a framework for formulating an effective treatment plan. Methodology Unsystematic clinical observations. Research tools Not specified	Results The major goals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. This information is essential to formulating an effective therapeutic plan. A detailed description of the headache should be obtained, including onset, location, quality, frequency, severity, duration, associated symptoms, triggers, functional impact, and changes	The findings are suitable for implementation in planning and management of posttraumatic headaches. The major goals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. And research result can be applied to the care of patients by using diagnostic criteria for type of headache and consider whether or not patients have headache and consider

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				in pattern over time. The specific characteristics of posttraumatic headaches can be used to classify them into categories that have treatment implications. Migraine characteristics include head pain that moderate or severe, unilateral or asymmetric, throbbing or pulsatile in quality, aggravated by or causes avoidance of routine physical activity, and accompanied by either nausea and vomiting or both light and sound sensitivity. The headache attacks last several hours to several days without treatment. Aura, a transient focal neurologic symptom that is most often visual in nature and precedes or accompanies the headache, occurs in a minority of patients with migraine and is not required for a headache to be considered a migraine. Cluster headache,	whether or not patients have received the right medications for each type of headaches. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification. Recommendations for treatment alternatives are composed cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				paroxysmal hemicranias, hemicranias continua, and SUNCT(short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing). Cervicogenic headaches occur when pain is generated or referred from a source in the cervical spine, such as cervical discs, facet joints, or myofascial structures. Cervicogenic headache is often located in the occipital area or posterior head region but may also affect anterior head regions. The head pain can be unilateral or bilateral. Patients with headaches should undergo a careful neurologic examination, including examination of vital signs and evaluation of mental status, cranial nerves, motor function, sensation, coordination, gait, and reflexes. Most patients with headaches in the sub-acute	Physical therapy is an important initial step in treating posttraumatic cervicogenic headache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. And can be applied to the care of patients by using standardized instruments can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test (HIT-6) and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				phase after concussion or mild head injury should have a normal neurologic examination. Head CT or MRI has been recommended in patients whose headache worsen or persist longer than one week after concussion. NSAIDs are a good first choice for most types of posttraumatic headaches. NSAIDs are effective for migraine, tension-type headache, and cervicogenic headache. The triptan class of medications should be tried in patients with migraine-type posttraumatic headaches that fail to respond adequately to NSAIDs. Triptan agents may be given incombination with an NSAID for increased effectiveness. There are a variety of combination analgesic products are marketed for acute treatment of headache. Such products	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				include Fioricet, Fiorinal, Midrin, and Excedrin. These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache. Excedrin has evidence supporting its effectiveness in migraine, but the other agents have not been rigorously tested. Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines headaches and the later three agents are FDA approved for prevention. Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache. Nonpharmacologic therapies include behavioral therapies,	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				physical modalities, and injection procedures. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yet often overlooked, technique. Patients should be encouraged to establish healthy meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeine, smoking, and alcohol use can contribute to headaches. specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. Cognitive behavioral therapy, relaxation therapy, and	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenic headache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. Standardized instruments can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test(HIT-6) and the	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
6.				Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.	
7.	Formisano, R., Bivona, U., Catani, S., D'Ippolito, M., &Buzzi, M. G. (2009). Post-Traumatic Headaches: Facts and Doubts.	Sample size (n=53) Patient who sustained mild (n=45) or moderate/severe (n=8) Traumatic brain injury and evaluated the presence of medication overuse Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified	Objective Focus on the paucity of information about headache following head trauma and will try to outline the needs for accurate research in this field to provide future revisions of the present guidelines. Methodology Unsystematic clinical observations. Research tools Not specified	Results The diagnostic criteria for posttraumatic headaches were as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 Either no loss of consciousness or loss of consciousness for <30 minutes 2.2 GCS ≥ 13 2.3 Diagnostic symptoms and/or signs of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma	The research findings can be applied to the care of patients by using diagnostic criteria for headaches following mild traumatic brain injury. The criteria can be used to diagnose whether patients really have headaches from mild traumatic brain injury or not. In addition, mental factors must also be evaluated because these factors can exacerbate headache severity so as to assure that patients receive proper treatment.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
7.		Exclusion criteria Not specified		4.2 Headache persists but 3 months have not yet passed since head trauma	
8.	Gladstone, J. (2009). From Psychoneurosis to ICHD-2: An Overview of the State of the Art in Posttraumatic Headaches.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective This clinical review highlights: 1. Views on posttraumatic headache throughout the last few centuries. 2. The International Headache Society Classification of Headache Disorders second Edition classification of posttraumatic headache. 3. The epidemiology of head injuries and posttraumatic headache.	Results Posttraumatic headache assessments include detailed checking of backgrounds regarding posttraumatic headache, e.g. mechanisms of injuries, posttraumatic symptoms, etc. The treatments of posttraumatic headache involve pharmacological and non-pharmacological treatments. Before conducting posttraumatic headache management, patients must be assessed by inquiries into their background, including details and coverage in line with posttraumatic headaches by assessing the frequency, duration, severity, screening of physiological diseases, and	Acute posttraumatic headache assessment criteria are suitable for implementation in evaluating patients' headaches. Posttraumatic headache evaluation involves checking the patients' history and posttraumatic symptoms; assessing characteristics, type and severity of posttraumatic headaches; and asking about history of physical and mental illnesses of patients. Posttraumatic headache management is composed of prescription of tricyclic antidepressants, beta-blockers, and anticonvalsants. Medications which help in the management of periodical

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
8.			4. The clinical characteristics of posttraumatic headache. 5. Posttraumatic headache related postconcussive symptoms. 6. Pathophysiology of posttraumatic headache. 7. Evaluation of posttraumatic headache. 8. Management of posttraumatic headache. Methodology Unsystematic clinical observations. Research tools Not specified	manifestation of illness in order to categorize mental conditions as the primary cause of headaches and screen symptoms that will cause permanent headaches, such as insomnia and depression. In cases where multiple symptoms or psychological symptoms occur, patients should be sent to experts or multidisciplinary teams for assessment in order to know the patients' headache type before cooperating with doctors in order to provide care for patients to prescribe medication suitable for the characteristics of illness. Most pharmacological headache treatments can be divided into two groups involving treatments for tension-type headaches and migraine headaches. The medications used in the treatment of common chronic headaches	headaches comprise non-steroidal anti-inflammatories, acetaminophen, acetylsalicylic acid, COX-2 inhibitors, and the non-pharmacological treatments for headache management recommended for headaches include relaxation exercises, such as yoga. And evaluation risk factors for posttraumatic headache and prognosis.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
8.				include tricyclic antidepressant while the medications used to prevent posttraumatic migraine headaches include tricyclic antidepressants, beta-blockers, and anticonvalsants. Medications which help in the management of periodical headaches comprise non-steroidal anti-inflammatories, acetaminophen, acetylsalicylic acid, COX-2 inhibitors, and isometheptene. Non-pharmacological treatments for headaches include relaxation exercises, such as yoga. The diagnostic criteria for acute posttraumatic headaches attributable to mild head injury are as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
8.				of the following: 2.1 No loss or loss of consciousness for < 30 minutes. 2.2 GCS ≥ 13 2.3 Diagnostic symptoms and/or signs of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months have not yet passed since head trauma Risk factors for posttraumatic headache and prognosis Female gender, age over 40 years, lower socioeconomic status, lower education, lower IQ, mild head injury, prior head injury, PTH depression, PTH stress disorder,preexisting psychopathology and pre-morbid	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
8.				personality, and unstable preinjury work history.	
9.	Lanaerts, M. E. & Couch, J. R. (2004). Posttraumatic Headaches.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Not specified Methodology Unsystematic clinical observations. Research tools Not specified	Results The best choice for treating acute headache after traumatic brain injury is analgesics, such as acetaminophen, naproxen, ibuprofen, and acetylsalicylic acid, for mild to moderate headaches. Steroids and lithium can be used for cluster headaches, while cervicogenic headaches can be treated with injections at specific sites. The neck area should be thoroughly examined to find traces of disease, and x-rays or CT scans may be required. CT scans or MRI scans in the spinal and neck areas to view any flexion or extension may be needed. And patients should be informed about headache physiology after traumatic brain	The findings are suitable for managing posttraumatic headaches. The population has characteristics similar to the study group. The findings can be applied to posttraumatic headache patients by ensuring that patients receive thorough examinations in the neck area to find traces of disease, ensuring that patients receive the right medication for their headache symptoms, and providing instruction about the pathology of posttraumatic headaches at levels each patient can comprehend with adjustments to prevent migraine headaches which require administration of beta blockers, calcium channel blockers, antidepressants,

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
9.				injury according to each patient's level of knowledge and understanding with behavior modification and management of mental factors, such as depression and anxiety, in order to help minimize risks for chronic headaches. Main Study Topic - Medications used to prevent migraine headaches are beta blockers, calcium channel blockers, antidepressants, and anticonvulsants. - Medications preventing migraine headaches are triptans, dihydroergotamine, nonsteroidal anti- inflammatories, and acetaminophen. - Medications used to prevent stress-related headaches include tricyclic antidepressants and muscle relaxers. -Medications used to prevent	triptans, dihydroergotamine, nonsteroidal anti-inflammatories, and acetaminophen. Medications that can be used to prevent cluster headaches include steroids, calcium channel blockers, anticonvulsants, and lithium.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
9.				cluster headaches include steroids, calcium channel blockers, anticonvulsants, and lithium. cluster headaches include steroids, calcium channel blockers, anticonvulsants, and lithium.	
10.	Lane, J. C. & Arciniegas, D. B. (2002). Posttraumatic Headaches.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Not specified Methodology Unsystematic clinical observations. Research tools Not specified	Results Treatment planning should involve CBC, erythrocyte sedimentation rate, serum chemistry, fasting glucose, and thyroid stimulating hormone in order to evaluate co-morbidities. - Education regarding headaches and headache management, such as recording headaches to monitor forms of headaches and recovery progress, will help patients believe they can control symptoms on their own. Proper stress management, coping strategies, sleep, and nutrition are	The findings are suitable for implementation in planning for and management of posttraumatic headaches by drawing blood for tests and checking patient history of co-morbidities. The population had characteristics similar to the group studied, and the findings can be applied in planning for and providing care to posttraumatic headache patients to ensure that patients receive correct and proper management and care for posttraumatic headaches.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
10.				all of important components of headache treatment programs. - Nurses should ensure that patients receive calcium channel-blockers, beta- adrenergic blockers, anticonvalsants, antidepressanges and nonsteroidal anti-inflammatories to help prevent headaches. Non-Pharmacological treatments. - Recommendations to relax muscles or physical therapy to reduce headache symptoms. - Biofeedback, cognitive restructuring and stress management treatments involve stress management by building confidence in patients as they control headaches on their own which will help relieve chronic headaches. - Psychotherapy Psychological assessments are	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
10.				recommended for patients with chronic posttraumatic headache. Psychotherapy for posttraumatic headache should have clear treatment goals and set times for successful goals. - Treatment by botulism toxin type A will help in the treatment of migraine or tension-type posttraumatic headaches, even though the mechanisms that help to relieve headaches are not understood. Therefore, nurses should coordinate with multi-disciplinary teams in non-pharmacological headache management.	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
11.	Linder, S. L. (2007). Posttraumatic Headache.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Not specified Methodology Unsystematic clinical observations. Research tools Not specified	Results The diagnostic criteria for posttraumatic headache were as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 Either no loss of consciousness or loss of consciousness for < 30 minutes 2.2 GCS ≥ 13 2.3 Diagnostic symptoms and/or signs of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months have not yet passed since head trauma	The findings can be implemented in the care of patients in terms of diagnosing posttraumatic headaches by using the criteria for diagnosing posttraumatic headaches in mild traumatic brain injury patients as criteria for assessing and using thorough diagnostic criteria for headaches to examine patients in order to determine the causes of headaches and properly manage posttraumatic headaches. The findings can also be applied to the care of patients with migraine headaches, ensuring that patients received suitable medications, namely, ibuprofen 10 mg/Kg. or NSAID 10 mg/Kg.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
11.				- Physical examinations of patients comprise the following: 1. Cervical spine examination 2. Skull-palpation of bones and muscles, and listen for bruits 3. Ears-external auditory meatus occlusion and motion 4.Temporomandibular joint palpitation and, range of motion 5. Nerves-palpation of supraorbital, trochlear, and occipital nerves, as well as cranial nerves IX-XII 6. Eyes-palpation and inspection 7. Sinuses-modified Muller'smaneuver 8. Evaluation for increased intracranial pressure 9. Teeth-inspection, percussion, and palpation 10. Carotid arteries-listen for bruits, palpate The	If headaches do not improve, triptan will be used in cases of short-term headaches, such as headaches lasting for less than 3 days.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
11.				aforementioned examinations are important to discover myofascial or categorization of presenting symptoms of centralallodynic-typeproblems. When searches are clear, symptoms can be categorized and pharmacological and non-pharmacological treatment can be started. The medication commonly used for patients with migraine headaches is ibuprofen 10 mg/Kg. or NSAID 10 mg/Kg. If headaches do not improve, triptan will be used in cases of short-term headaches, such as headaches lasting for less than 3 days.	

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
12.	Lucas, S. (2011). Headache Management in Concussion and Mild Traumatic Brain Injury.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Not specified Methodology Unsystematic clinical observations. Research tools Not specified	Results The goal of treatment is to educate the patients to treat the headache early on with effective, high-efficacy therapy. Acute migraine treatment can be divided into nonspecific and specific treatments. A large group of nonspecific medications include aspirin, acetaminophen, and nonsteroidal anti-inflammatory drugs such as naproxen, diclofenac, and ibuprofen, as well as a combination of products such as aspirin-acetaminophen-caffeine. Nonsteroidal anti-inflammatory drugs and aspirin cause gastritis, gastrointestinal bleeding, increased bleeding time, and peptic ulcer disease. These medicines should not be used during the first 24 hours after a head injury to limit the possibility of bleeding.These medications	The findings are suitable for managing post traumatic headaches. The population has characteristics similar to the study group. The findings can be applied to posttraumatic headache patients by ensuring that patients receive education so that they treat the headache early on with effective, high-efficacy therapy. As for acute migraine treatment, a large group of nonspecific medication such as aspirin, acetaminophen, and nonsteroidal anti-inflammatory drugs such as naproxen, diclofenac, and ibuprofen, as well as a combination of products such as aspirin-acetaminophen-caffeine can be used. Triptans, the ergotaminees, and dihydroergotamine represent a class of treatment medications

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
12.				also should not be used if a patient with a head injury may require surgery later on. Triptans, the ergotaminees, and dihydroergotamine represent a class of treatment medications that are migraine specific. The following acute treatment goals are recommended based on evidence-based guidelines: (1) treat a migraine attack as soon as possible after onset and if the headache recurs, then re- treat it; (2) the goal of treatment is to restore the patients' ability to function, care should be stratified based on attack severity and disability, and an attempt should be made to match the efficacy of the initial headache therapy to the treatment needed; (3) minimize the use of backup and rescue medications by making sure that	that are migraine specific. Ensuring that patients receive the right medication for their headache symptoms and providing instruction about the pathology of posttraumatic headaches at levels each patient can comprehend with adjustments are highly recommended.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
12.				the initial drug is effective; (4) optimize self-care by means of patient education and an effective treatment plan with effective patient "tools" to avoid urgent care visits or lapse from physician care; and (5) avoid or minimize adverse effects by choosing medication with good tolerability as initial therapy.	
13.	McGeeney, B. E. (2009). Secondary Headaches: Concepts and Examples.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Take a closer look at a couple of disorders and presentations of secondary headache. Methodology Unsystematic clinical observations. Research tools Not specified	Results The medication used in treating posttraumatic headaches involves anti-inflammatory agents and acetaminophen. Sometimes patients may have to be given anti-emetics, such as metoclopramide and chlorpromazine. The medications used in treating acute posttraumatic headaches include amitriptyline and divalproex. The medications used to treat migraine headaches include triptans andergotamines.	The findings are suitable for managing posttraumatic headache pain. The population has characteristics similar to the group studied. The findings can be applied to the care of patients with medications that are suitable for posttraumatic headache pain management. Acute posttraumatic headache management is composed of amitriptyline and divalproex. Migraine headache management

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
13.				Treatment for posttraumatic headaches should also manage psychological factors, such as depression and anxiety, because these factors can cause chronic headaches.	involves triptans andergotamines. Moreover, the treatment of posttraumatic headaches should also manage psychological factors, such as depression and anxiety because these factors can cause chronic headaches.
14.	Obermann, M., Keidel, M., & Diener, H. C. (2010). Posttraumatic Headache: Is It for Real? Crossfire Debate on Headaches: Pro	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective Not specified Methodology Unsystematic clinical observations. Research tools Not specified	Results The mainstay of posttraumatic headache treatments is to prevent development of posttraumatic headaches into chronic headaches. Predictors of development into chronic posttraumatic headaches are related to whiplash injuries, old age, female gender, psychological problems, anxiety, financial problems, abnormal neck angles immobilization, chiropractice, local injections, medication overuse and missing significant co-morbidities, which	The findings are suitable for implementation in assessing and managing posttraumatic headaches. The population had characteristics similar to the studied group. The findings can be applied to the assessment of patients at risk for chronic posttraumatic headaches. The care of patients with posttraumatic headache management include not limiting movement, not massaging the spine, and offering advice and care by not

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
14.				are significant major pitfalls in the management of posttraumatic headaches.	having patients receive too much medication which might be the cause of increasing headaches.
15.	Packard, R. C. (2008). Chronic Posttraumatic Headache: Associations with Mild Traumatic Brain Injury, Concussion, and Post-concussive Disorder.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective This article reviews and updates current terminology and definitions for these head injuries, along with current concepts of pathophysiology. Methodology Unsystematic clinical observation Research tools Not specified	Results Diagnostic criteria for mild traumatic brain1 injuries is as follows: as manifested by at least one of the following: 1. Any loss of consciousness; 2. Any loss of memory for events immediately before or after accident; 3. Any alteration in mental state at the time of the accident (feelings dosed, disoriented, or confused); or 4. Focal neurological deficits that may or may not be transient. The period of loss of consciousness should be 30 minutes or less. After 30 minutes, the initial	The findings can be implemented in the care of patients in terms of using the criteria to correctly diagnose mild traumatic brain injuries in patients.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
15.				Glasgow Coma scale (GCS) score is 13 to 15. Posttraumatic amnesia should not last longer than 24 hours.	
16.	Seifert, T. D. & Evans, R. W. (2010). Posttraumatic Headache: A Review.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective This article reviews the history, epidemiology, type, pathophysiology, treatment, and prognosis of posttraumatic headache. Methodology Unsystematic clinical observations. Research tools Not specified	Results Medications used in the treatment of posttraumatic headaches include propranolol, amitriptyline, and valproate. The medications used in the treatment of acute posttraumatic headache are composed of NSAID, simple analgesics, and Triptants. Education about mild traumatic brain injury and posttraumatic headaches is an important part of the treatment plan.	Management of acute posttraumatic headaches is composed of prescription of NSAID, simple analgesics and Triptants. Providing instruction to patients about posttraumatic headache symptoms is essential to help in the treatment of posttraumatic headaches.

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
17.	Vargas, B. B. & Dodick, D. W. (2012). Posttraumatic Headache.	Sample size Not specified Duration of data collection Not specified Setting Not specified Inclusion criteria Not specified Exclusion criteria Not specified	Objective This brief review highlights recent advances in the epidemiology, evaluation, and management of concussion, mild traumatic brain injury, and posttraumatic headaches. Methodology Unsystematic clinical observations. Research tools Not specified	Results Posttraumatic headache exacerbations are commonly managed acutely with simple analgesics such as NSAIDs and acetaminophen, which are also useful in the treatment of some cases of migraine. Amitriptyline is frequently used for posttraumatic headaches that present themselves as tension-type headache and is also a well accepted first-line treatment for migraine headaches. Tricyclic antidepressants can be quite sedating and are therefore potentially useful when treating comorbid depression or insomnia.	The findings are suitable for implementation in planning and management of posttraumatic headaches. Posttraumatic headache exacerbations are commonly managed acutely with simple analgesic such as NSAIDs and acetaminophen. Amitriptyline is frequently used for posttraumatic headaches that present themselves as tension-type headaches and is also a well accepted first-line treatment for migraine headaches. Tricyclic antidepressants can be quite sedating and are therefore potentially useful when treating comorbid depression or insomnia. The population had characteristics similar to the

Table 3.2 –Table Summarizing and Evaluating the Quality of Evidence-Based Practice (cont.)

No	Author/ Publishing year/ Title	Sample size	Objective and Methodology	Results	Summary of implementation
17.					group studied, and the findings can be applied in planning and care for posttraumatic headache patients to ensure that patients receive correct and proper management and care for posttraumatic headaches.

Table 3.3: Collective Table

No	Article and Level of evidence	Study	Summary of implementation
1.	Systematic review of interventions for post-traumatic headache Watanabe, T. K., Bell, K. R. Walker, W. C. &Schomer, K. (2012) (Level 4)	The specific goal of this review include -Determination of effective interventions for posttraumatic headache, -development of treatment recommendation, -identification of gaps in the current medical literature regarding post traumatic headache treatment, -suggestions for future directions in research to improve outcome for person with posttraumatic headache.	The range of medications used included sumatriptan, intravenous ergotamine and metoclopramide, topical ketoprofen, indomethacin, valproic acid, amitriptyline, and propranolol. Biologically based interventions included a variety of biofeedback mechanisms, physical therapy and manual therapy, immobilization devices, ice, and injections. Behavioral interventions were cognitive behavioral therapy, relaxation techniques, biofeedback, and education. Suggested treatment algorithms acute headache after traumatic brain injury: 1. Consider performing a workup for intracranial abnormality base on accompanying signs and symptoms 2. Categorize headache typology. 3. For severe (functionally limiting) acute posttraumatic headache of any typology, consider use of time limited opioids. 4. For mild to moderate posttraumatic headache of any typology including tension-type headache, consider a trial of acetaminophen and/or nonsteroidal anti-inflammatory drugs, also time limited. 5. Treat associated comorbidities. 6. For headaches that meet the criteria for migraine, initiate a trial of abortive medication (ie, triptans). 7. For headaches associated with cervical spine pain, begin with gentle mobilization. Type of headache and Diagnostic criteria <u>Migraine without aura</u> A. At least 5 attacks fulfilling criteria B-D B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated) C. Headache has at least 2 of the following characteristics:

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
1.			Unilateral location Pulsating quality Moderate or severe pain intensity Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs) D. During headache at least one of the following: Nausea and/or vomiting Photophobia and phonophobia E. Not attributed to another disorder Migraine with aura A. At least 2 attacks fulfilling criteria B-D B. Aura consisting of at least 1of the following but no moter weakness: Fully reversible visual symptoms, including positive features (eg, flickering lights, spots, or lines) and/or negative features (ie, loss of vision) Fully reversible sensory symptoms including positive features (ie, pain and needles) And/or negative features (ie, numbness) Fully reversible dysphasic speech disturbanceC. At least 2 of the following: Homonymous visual symptoms and/or unilateral sensory symptoms At least one aura symptom develops gradually over ≥ 5 minutes and/or different aura symptoms occur in succession over ≥ 5 minutes Each symptom lasts ≥5 minutes and ≤ 60 minutes D. Headache fulfilling criteria B-D above for migraine without aura begins during the aura or follows aura within 60 minutes E. Not attributed to another disorder Probable migraine (with or without aura) Fulfills all but one of the criteria (A-D) previously listed for migraine headaches

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
1.			A. At least 10 episodes occurring on < 1 day/month on average (< 12 day/year) and fulfilling criteria B-D B. Headache lasting from 30 minutes to 7 days C. Headache has at least 2 of the following characteristics: Bilateral location Pressing and/or tightening (nonpulsating) quality Mild or moderate intensity Not aggravated by routine physical activity such walking or climbing stairs D. Both of the following: No nausea or vomiting (anorexia may occur) No more than one of photophobia or phonophobia E. Not attributed to another disorder <u>Frequent episodic tension type</u> At least 10 episodes occurring on ≥ 1 but < 15 day/month for at least 3 months (≥ 12 < 180 day/year) and fulfilling criteria B-E (as above for infrequent episodic tension-type headaches) Acute posttraumatic headache develops with 7 day of injury, persists ≤ 3 months <u>Cervicogenic headache</u> A. Pain, referred from a source in the neck and perceived in one or more regions of the head and/or face, fulfilling criteria C and D B. Clinical, laboratory, and/or imaging evidence of a disorder or lesion within the cervical spine or soft tissues of the neck known to be or generally accepted as a valid cause of headache C. Evidence that the pain can be attributed to the neck disorder or lesion based on at least one of the following:

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
1.			Demonstration of clinical signs that implicate a source of pain in the neck abolition of headache after diagnostic blockade of a cervical structure or its nerve supply by using placebo or other adequate controls D. Pain resolves within 3 months after successful treatment of the causative disorder or lesion
2.	Characteristics and Treatment of Headache after Traumatic Brain Injury. Lew, L. H. et al. (2006). (Level 4)	The article can be summarized as follows: The treatment of post traumatic headaches comprised pharmacological treatments and non pharmacological treatments	The mainstay of treatment is to prevent chronic headaches - In posttraumatic headache management, the factors causing headaches must be assessed, e.g. musculoskeletal, vascular, visceral, neural and biomechanics, including assessment of stress and anxiety in patients because these factors can exacerbate headaches. - Although pharmacological headache management is not a direct nursing role, nurses must assess the headache characteristics of patients in order to coordinate with doctors in providing care for patients to receive proper medications according to headache types with the provision of recommendations regarding correct medication adherence for patients. -The treatment of posttraumatic headaches comprised pharmacological treatments and non-pharmacological treatments. -Treatment for acute tension-type and migraine headaches involves simple analgesics and non-steroidal anti- anti-inflammatory medications. -Medications used to prevent migraine headaches included calcium channel blockers, anticonvulsants, anticonvulsants, antidepressants and beta blockers. -Medications used to treat tension-type headaches included antidepressants and musclerelaxants. - Medications used to treat acute migraine included ergotamine, dihydroergotamine, and the triptans. - Specific alternative treatments for posttraumatic headache included

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
2.			physical therapy, massages, psychological and behavioral management. - Psychologic evaluation and behavior therapy, as well as lifestyle change and avoidance of medication overuse, are also important in management of posttraumatic headache. The mainstay of treatment is to prevent chronicity by using prophylactic medications, to adequately control the use of multiple medications in the acute stage, as well as to diminish the risks of the rebound phenomenon induced by medication overuse. The diagnostic criteria for acute posttraumatic headache attributed to mild head injury was as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 No loss or loss of consciousness for < 30 minutes. 2.2 GCS ≥ 13. 2.3 Diagnostic symptoms and/or signs of concussions 3. Headache develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months have not yet passed since trauma
3.	A prospective controlled study in the prevalence of posttraumatic headache following mild traumatic brain injury. Faux, S., &Sheedy, J. (2008).	Follow-up studies were conducted on headache.	Follow-up on headaches in mild traumatic brain injury patients must be increased during the first and third month following injuries. The article can be implemented in practice to help nurses gain the understanding that mild traumatic brain injury patients can involve posttraumatic headache lasting as long as three months and causing suffering in patients. The mainstay to treatment is to explain and provide recommendations for patients regarding existing symptoms and assure patients that headaches will improve better most posttraumatic headaches disappear within 0-3 months after sustaining injuries. The Visual Analog Scores of Pain (VAS) with scores ranging from 0 to 10points was used to assess the headaches of mild traumatic brain injury patients, with 0 points indicating no pain while 10 points

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
3.	(Level 4)		indicating maximum pain, thereby enabling nurses to know the level of pain of each patient and provide care to ensure proper pain management given to patients.
4.	The Relationships between Post Concussion Syndrome and Functional Status in Patients with Mild Traumatic Brain Injury.Intira Ta-ue, (2009). (Level 6)	To investigate the relationship between symptoms of posttraumatic headaches and functional status in mild traumatic brain injury patients.	Mild traumatic brain injury patients suffered from symptoms of posttraumatic headaches such as headache, dizziness, memory loss, and fatigue. The patients may suffer from only one symptom or multiple symptoms simultaneously. The severity of symptoms affects patients' psychosocial and physical functional status. Medical personnel should offer advice to ensure patients' and caregivers' readiness to cope with such symptoms that may occur at home after hospital discharge. Nursing care plans should also be devised to effectively promote patients' recovery from such symptoms. Continuous and consistent monitoring and coordination are also required.
5.	Posttraumatic headache. Erickson, J. C., Neely, E. T. &Theeler, B. J. (2010). (Level 7)	This article reviews the classification, epidemiology, prognosis, and pathophysiology of headaches after traumatic brain injury and provides a practical clinical approach for	Themajorgoals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. This information is essential to formulating an effective therapeutic care. A detailed description of the headache should be obtained, including onset, location, quality, frequency, severity, duration, associated symptoms, triggers, functional impact, and changes in pattern over time. The specific characteristics of posttraumatic headaches can be used to classify them into categories that have treatmentimplications. Patients with headaches should undergoa careful neurologic examination, including vital signs

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
5.		evaluating and treating patients with posttraumatic headaches	and evaluation of mental status, cranial nerves, motor function, sensation, coordination, gait, and reflexes. Most patients with headaches in the subacute phase after concussion or mild head injury should have a normal neurologic examination. Head CT or MRI has been recommended in patients whose headache worsen or persist longer than one week after concussion. NSAIDs are a good first choice for most types of posttraumatic headaches. NSAIDs are effective for migraine, tension-type headache, and cervicogenic headache. The triptan class of medications should be tried in patients with migraine-type posttraumatic headaches that fail to respond adequately to NSAIDs. Patients who experience nausea or vomiting during acute migraine attacks should be prescribed an antiemetic agent, such as metoclopramide, prochlorperazine, or promethazine. Triptan agents may be given incombination with an NSAID for increased effectiveness.A variety of combination analgesic products are marketed for acute treatment of headache. Such products include butalbital/acetaminophen/caffeine (Fioricet), butalbital/aspirin/caffeine (Fiorinal), acetaminophen/isometheptene/dichloralphenazone(Midrin), andacetaminophen/aspirin/caffeine (Excedrin). These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache. Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines and are first-line options for prevention of posttraumatic migraine headaches. Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache. Nonpharmacologic therapies include behavioral therapies, physical modalities, and injection procedures. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan.Patient should

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
5.			given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yetoften overlooked, technique. Patients should be encouraged to establish healthy meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeineoveruse, smoking, and alcohol use can contribute to headaches.specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. Cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenicheadache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. acetaminophen/aspirin/caffeine (Excedrin). These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache. Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines and are first-line options for prevention of posttraumatic migraine headaches. Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache. Nonpharmacologic therapies include behavioral therapies, physical modalities, and injection procedures. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yetoften overlooked, technique. Patients should be encouraged to establish healthy

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
5.			meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeineoveruse, smoking, and alcohol use can contribute to headaches.specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. Cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established.Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenicheadache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine.Standardized instruments can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test (HIT-6)and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.
6.	Posttraumatic headache. Erickson, J. C. &Theeler, B. J. (2012). (Level 7)	Classifying the phenotype of posttraumatic headache helps guide treatment.	Themajorgoals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. This information is essential to formulating an effective therapeutic plan. A detailed description of the headache should be obtained, including onset, location, quality, frequency, severity, duration, associated symptoms, triggers, functional impact, and changes in pattern over time. The specific characteristics of posttraumatic headaches can be used to classify them into categories that have treatment implications. Migraine characteristics include head pain that moderate or severe, unilateral or

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
6.			asymmetric, throbbing or pulsatile in quality, aggravated by or causes avoidance of routine physical activity, and accompanied by either nausea and vomiting or both light and sound sensitivity. The headache attacks last several hours to several days without treatment. Aura, a transient focal neurologic symptom that is most often visual in nature and precedes or accompanies the headache, occurs in aminority of patients with migraine and is not required for a headache to be considered a migraine. Cluster headache, paroxysmal hemicranias, hemicranias continua, and SUNCT(short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing). Cervicogenic headaches occur when pain is generated or referred from a source in the cervical spine, such as cervical discs, facet joints, or myofascial structures. Cervicogenic headache is often located in the occipital area or posterior head region but may also affect anterior head regions. The head pain can be unilateral or bilateral. Patients with headaches should undergo a careful neurologic examination, includingexamination of vital signs and evaluation of mental status, cranial nerves, motor function, sensation, coordination, gait, and reflexes. Most patients with headaches in the sub-acute phase after concussion or mild head injury should have abnormal neurologic examination. Head CT or MRI has been recommended in patients whose headache worsen or persist longer than one week after concussion. NSAIDs are a good first choice for most types of posttraumatic headaches. NSAIDs are effective for migraine, tension-type headache, and cervicogenic headache. The triptan class of medications should be tried in patients with migraine-type posttraumatic headaches that fail to respond adequately to NSAIDs. Triptan agents may be givenincombination with an NSAID for increased effectiveness.Thereare a variety of combination analgesic products are marketed for acute treatment of

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
6.			headache. Such products include Fioricet, Fiorinal, Midrin, and Excedrin. These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache. Excedrin has evidence supporting its effectiveness in migraine, but the other agents have not been rigorously tested. Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines headaches and the later three agents are FDA approved for prevention. Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache. Nonpharmacologic therapies include behavioral therapies, physical modalities, and injection procedures. All patient with posttraumatic headaches should recive education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yetoften overlooked, technique. Patients should be encouraged to establish healthy meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeine, smoking, and alcohol use can contribute toheadaches. specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. Cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenicheadache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine. Standardized

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
6.			instruments can aid in the evaluation of patient with posttraumatic headache. Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test (HIT-6) and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales.
7.	Post-Traumatic Headaches: Facts and Doubts Formisano, R., Bivona, U., Catani, S., D'Ippolito, M., &Buzzi, M. G. (2009). (Level 7)	The article can be summarized as follows: In general, headache management following traumatic brain injury depends upon the type of clinical pain.	- Headache management in mild traumatic brain injury patients requires diagnostic criteria to assess and ensure that patients received proper management. The diagnostic criteria for PTH was as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 Either no loss of consciousness or loss of consciousness for < 30 minutes 2.2 GCS ≥ 13 2.3 symptoms and/or signs diagnostic of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months not yet passed since head trauma

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
8.	From psychoneurosis to ICHD-2: An Overview of the State of the Art in Post- State of the Art in Post-Traumatic Headaches Gladstone, J. (2009). (Level 7)	The article can be summarized as follows: Posttraumatic headache management remains deficient in terms of evidence-based practice, research and clear management guidelines. Most treatments of posttraumatic headaches involve pharmacological treatments and non-pharmacological treatments.	Posttraumatic headache assessments include detailed checking of backgrounds regarding posttraumatic headache, e.g. mechanisms of injuries, posttraumatic symptoms, etc. The treatments of posttraumatic headache involve pharmacological and non-pharmacological treatments. Before conducting posttraumatic headache management, patients must be assessed by inquiries into their background, including details and coverage in line with posttraumatic headaches by assessing the frequency, duration, severity, screening of physiological diseases, and manifestation of illness in order to categorize mental conditions as the primary causeof headaches and screen symptoms that will cause permanent headaches, such as insomnia and depression. In cases where multiple symptoms or psychological symptoms occur, patients should be sent to experts or multidisciplinary teams for assessment in order to know the patients' headache type before cooperating with doctors in order to provide care for patients to prescribe medication suitable for the characteristics of illness. Most pharmacological headache treatments can be divided into two groups involving treatments for tension-type headaches and migraine headaches. The medications used in the treatment of common chronic headaches include tricyclic antidepressantwhile the medications used to prevent posttraumatic migraine headaches include tricyclic antidepressants, beta-blockers, and anticonvalsants. Medications which help in the management of periodical headaches comprise non-steroidal anti-inflammatories, acetaminophen, acetylsalicylic acid, COX-2 inhibitors, and isometheptene. Non-pharmacological treatments for headaches include relaxation exercises, such as yoga. The diagnostic criteria for acute posttraumatic headaches attributable to mild head injury are as follows:

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
8.			1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 No loss or loss of consciousness for < 30 minutes 2.2 GCS ≥ 13 2.3 Diagnostic symptoms and/or signs of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months have not yet passed since head trauma Risk factors for posttraumatic headache and prognosis Female gender, age over 40 years, lower socioeconomic status, lower education, lower IQ, mild head injury, prior head injury, PTH depression, PTH stress disorder,preexisting psychopathology and pre-morbid personality, and unstable preinjury work history.
9.	Posttraumatic Headaches Lanaerts, M. E. & Couch, J. R. (2004). (Level 7)	The article can be summarized as follows: Headache management from the early stages following traumaticbrain injury and providing suitable and adequate treatment will help patients improved conditions.	The best choice for treating acute headache after traumatic brain injury is analgesics, such as acetaminophen, naproxen, ibuprofen, and acetylsalicylic acid, for mild to moderate headaches. Steroids and lithium can be used for cluster headaches, while cervicogenic headaches can be treated with injections at specific sites.The neck area should be thoroughly examined to find traces of disease, and x-rays or CT scans may be required. CT scans or MRI scans in the spinal and neck areas to view any flexion or extension may be needed. And patients should be informed about headache physiology after traumatic brain injury according to each patient's level of knowledge and understanding withbehavior modification and management of mental factors, such as depression and anxiety, in order to help minimize risks for chronic headaches. Main Study Topic

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
9.			- Medications used to prevent migraine headaches are beta blockers, calcium channel blockers, antidepressants, and anticonvulsants. - Medications preventing migraine headaches are triptans, dihydroergotamine, nonsteroidal anti-inflammatories, and acetaminophen. - Medications used to prevent stress-related headaches include tricyclic antidepressants and muscle relaxers. -Medications used to preventcluster headaches include steroids, calcium channel blockers, anticonvulsants, and lithium.
10.	Post-Traumatic Headaches Lane, J. C. &Arciniegas, D. B. (2002). (Level 7)	The content can be summarized as follows: Headaches are one of the most frequently encountered symptoms following traumatic brain injury. Treatment guidelines for headaches involve Pharmacological care.	Treatment planning should involve CBC, erythrocyte sedimentation rate, serum chemistry, fasting glucose, and thyroid stimulating hormone in order to evaluate co-morbidities. - Education regarding headaches and headache management, such as recording headaches tomonitor forms of headaches and recovery progress, will help patients believe they can control symptoms on their own. Proper stress management, coping strategies, sleep, and nutrition are all of important components of headache treatment programs. - Nurses should ensure that patients receive calcium channel-blockers, beta-adrenergic blockers, anticonvalsants, antidepressanges and nonsteroidal anti-inflammatories to help prevent headaches. Non-Pharmacological Treatments. - Recommendations to relax muscles or physical therapy to reduce headache symptoms. - Biofeedback, cognitive restructuring and stress management treatments involve stress management by building confidence in patients as they control headaches on their own which will help relieve chronic headaches. - Psychotherapy Psychological assessments are recommended for patients with chronic post-

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
10.			traumatic headache. Psychotherapy for post traumatic headache should have clear treatment goals and set times for successful goals. - Treatment by botulism toxin type A will help in the treatment of migraine or tension-type posttraumatic headaches, even though the mechanisms that help to relieve headaches are not understood. Therefore, nurses should coordinate with multi-disciplinary teams in non-pharmacological headache management.
11.	Post-Traumatic Headache. Linder, S. L. (2007). (Level 7)	The article can be summarized as follows: posttraumatic headaches can be found in minor, moderate and severe head injury patients. Most headaches will disappear within 3-6 months after sustaining injuries. However, some patients continue to have chronic headaches. Posttraumatic head injury management	- Headache management requires diagnostic criteria to care for and manage headaches properly before assessing and checking headaches with coverage to determine the causes of headaches. The diagnostic criteria for PTH was as follows: 1. Headache, no typical characteristics known, fulfilling criteria 2 and 3 2. Head trauma with at least one of the following: 2.1 Either no loss of consciousness or loss of consciousness for < 30 minutes. 2.2 GCS ≥ 13 2.3 symptoms and/or signs diagnostic of concussions 3. Headaches develops within 7 days after head trauma 4. One of the following: 4.1 Headache resolves within 3 months after head trauma 4.2 Headache persists but 3 months not yet passed since head trauma - Physical examinations of patients comprised the following: 1. Cervical spine examination 2. Skull- palpation of bones, muscles, and listen for bruits 3. Ears- external auditory meatus occlusion and motion 4.Temporomandibular joint- palpitation, range of motion

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
11.		must categorize and assess headaches by using criteria in the diagnosis of the International Headache Society (HIS) of 2004 in order to have clarity and accuracy.	5. Nerves- palpation of supraorbital, trochlear, and occipital nerves, as well as cranial nerves IX-XII 6. Eyes- palpation and inspection 7. Sinuses- modified Muller's maneuver 8. Evaluation for increased intracranial pressure 9. Teeth- inspection, percussion, palpation. 10.Carotid arteries- listen for bruits, palpate - Headache management involves pharmacological treatments and non-pharmacological treatments - Medications commonly used to treat patients with migraine headaches include ibuprofen 10 mg/Kg or NSAID 10mg/Kg. If headaches do not improve, triptans are used.
12.	Headache management in concussion and mild traumatic brain injury Lucas, S. (2011). (Level 7)	The content can be summarized as follows: Headaches are one of the most frequently encountered symptoms following traumatic brain injury. Treatment guidelines for headaches involve pharmacological care aimed.	The goal of treatment is to educate the patients to treat the headache early on with effective, high-efficacy therapy. Acute migraine treatment can be divided into nonspecific and specific treatments. A large group of nonspecific medications include aspirin, acetaminophen, and nonsteroidal anti-inflammatory drugs such as naproxen, diclofenac, and ibuprofen, as well as a combination of products such as aspirin-acetaminophen-caffeine. Nonsteroidal anti-inflammatory drugs and aspirin cause gastritis, gastrointestinal bleeding, increased bleeding time, and peptic ulcer disease. These medicines should not be used during the first 24 hours after a head injury to limit the possibility of bleeding. These medications also should not be used if a patient with a head injury may require surgery later on. Triptans, the ergotaminees, and dihydroergotamine represent a class of treatment medications that are migraine specific. The following acute treatment goals are recommended based on evidence-based guidelines: (1) treat a migraine attack as soon as possible

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
12.			after onset and if the headache recurs, then re-treat it; (2) the goal of treatment is to restore the patients' ability to function, care should be stratified based on attack severity and disability, and an attempt should be made to match the efficacy of the initial headache therapy to the treatment needed; (3) minimize the use of backup and rescue medications by making sure that the initial drug is effective; (4) optimize self-care by means of patient education and an effective treatment plan with effective patient "tools" to avoid urgent care visits or lapse from physician care; and (5) avoid or minimize adverse effects by choosing medication with good tolerability as initial therapy.
13.	Secondary Headaches: Concepts and Examples. McGeeney, B. E. (2009). (Level 7)	The article can be summarized as follows: Pharmacological treatments of posttraumatic headaches are similar to primary treatments for headache.	-Assessments of posttraumatic headaches require knowledge of definitions, i.e. headaches occurring within 7 days after sustaining head injuries or after regaining consciousness following head injuries. - Although pharmacological headache management is not a direct nursing role, nurses must know the types of medications suitable for treating each headache type in order to ensure that patients receive the right types of medications. - Medications used for the treatment of acute headaches involves anti-inflammatory agents and acetaminophen. If patients had symptoms ofnausea and vomiting, nurses should coordinate with doctors to ensure that patients receive anti-emetics, such as metoclopramide and chlorpromazine. -Medications used in the treatment of chronic posttraumatic headaches include amitriptyline and divalproex. - Medications used in the treatment of migraine headaches include triptans and ergotamines.

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
14.	Post-Traumatic Headache: Is It for Real? Crossfire Debate on Headaches: Pro. Obermann, M., Keidel, M., &Diener, H. C. (2010). (Level 7)	The article can be summarized as follows: The mainstay of posttraumatic headache management is the prevention of headaches from developing into chronic posttraumatic headaches.	The mainstay of posttraumatic headache treatments is to prevent development of posttraumatic headaches into chronic headaches. Predictors of development into chronic posttraumatic headaches are related to whiplash injuries, old age, female gender, psychological problems, anxiety, financial problems, abnormal neck angles immobilization, chiropractice, local injections, medication overuse and missing significant co-morbidities, which are significant major pitfalls in the management of posttraumatic headaches.
15.	Chronic Post-traumatic Headache: Associations with Mild Traumatic Brain Injury, Concussion, and Postconcussive Disorder. Packard, R. C (2008) (Level 7)	The content can be summarized as follows: According to the literature review in 2004, the World Health Organization Collaborating Center Task Force on Mild Traumatic Brain Injury was found to have used the following criteria for diagnosing mild traumatic brain injuries: diagnosing mild traumatic brain injuries.	- In the management of posttraumatic headaches in mild traumatic brain injury patients, essential knowledge of diagnostic criteria for mild traumatic brain injuries is as follows: as manifested by at least one of the following: 1.Any loss of consciousness; 2.Any loss of memory for events immediately before or after accident; 3.Any alteration in mental state at the time of the accident (feelings dosed, disoriented, or confused); or 4.focal neurological deficits that may or may not be transient. The period of loss of consciousness should be 30 minutes or less. After 30 minutes, the initial Glasgow Coma scale (GCS) score is 13 to 15. Post-traumatic amnesia should not last longer than 24 hours.

Table 3.3: Collective Table (cont.)

No	Article and Level of evidence	Study	Summary of implementation
16.	Posttraumatic Headache: A Review. Seifert, T. D. & Evans, R. W. (2010). (Level 7)	The article can be summarized as follows: In order to achieve optimal results for patients, efforts should be coordinated between the multi-disciplinary team and there should be systematic assessments of patients with coverage of physiological and psychological.	Therefore, nurses should know the types of medications suitable for headache types in order to ensure that patients receive correct medications. Medications used in the prevention of posttraumatic include propranolol, amitriptyline or valproate. -Medications used in the treatment of acute headaches include NSAID and simple analgesics. - Management of posttraumatic headaches should provide recommendations for patients regarding mild traumatic brain injuriesand headaches so patients can understand and practice correctly, which is essential to treatment.
17.	Posttraumatic headache Vargas, B. B. &Dodick, D. W. (2012). (Level 7)	This brief review highlights recent advances in the epidemiology, evaluation, and management of concussion, mild traumatic brain injury, and posttraumatic headache.	Posttraumatic headache exacerbations are commonly managed acutely with simple analgesics such as NSAIDs and acetaminophen, which are also useful in the treatment of some cases of migraine. Amitriptyline is frequently used for posttraumatic headaches that present themselves as tension-type headache and is also a well accepted first-line treatment for migraine headaches. Tricyclic antidepressants can be quite sedating and are therefore potentially useful when treating comorbid depression or insomnia.

The search resulted in 52 research studies. Of these, 35 were excluded, while 16 were selected. Of the 17 studies, two were categorized in Level 4, one was categorized in Level 5, one was categorized in Level 6, and 13 were categorized in Level 7. The selected studies were found to be valid and reliable and could be used in the analysis and synthesis of posttraumatic headache management in mild traumatic brain injury patients, which was the topic of the study.

The Conclusion of Evidence-Based Synthesis

Based on the analysis and synthesis of 17 evidence-based practices, the investigator was able to obtain a summary of guidelines for posttraumatic headache management in mild traumatic brain injury patients in order to help patients receive proper assessment, monitoring, management**,** and education.

1. Assessment of Posttraumatic Headaches

1.1 History taking

1.1.1 Initial assessments of factors causing headaches consist of the musculoskeletal, vascular, neural, and biomechanics factors. In addition, assessments of the stress and anxiety of patients are required because these factors increase headaches (Lew, 2006).

1.1.2 Initial assessments of the exact mechanism of the injury are needed to obtain a sense for the biomechanical force applied. Healthcare team members need to ask about immediate post-injury symptoms, including loss of consciousness, alteration of consciousness, confusion/loss of awareness, amnesia, dizziness/vertigo, nausea, vomiting, and visual disturbances. Initial assessments of physiological diseases are also necessary in order to assess headache severity. Initial assessments of the frequency, duration, quality and characteristics of headaches are needed as well (Gladstone, 2009).

1.1.3 The major goals of the clinical evaluation are to exclude serious underlying medical etiologies, establish an accurate headache diagnosis, determine the impact of the headaches on the individual, and identify important comorbid conditions that may be perpetuating or exacerbating the headache. A detailed description of the headache should be obtained, including onset, location,

quality, frequency, severity, duration, associated symptoms, triggers, functional impact, and changes in pattern over time (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

1.1.4 Patients must be assessed by inquiries into their background, including details and coverage in line with posttraumatic headaches by assessing the frequency, duration, severity, screening of physiological diseases, and manifestation of illness in order to categorize mental conditions as the primary cause of headaches and screen symptoms that will cause permanent headaches (Gladstone, 2009).

1.1.5 Predictors of development into chronic posttraumatic headaches are related to whiplash injuries, old age, female gender, psychological problems, anxiety, financial problems, abnormal neck angles immobilization, chiropractice, local injections, medication overuse and missing significant co-morbidities (Obermann, Keidel, & Diener, 2010).

1.1.6 Pain severity is generally evaluated by using The Visual Analog Scores of Pain (VAS) with scores ranging from 0 to 10 points to assess the headaches experienced by mild traumatic brain injury patients, with the score of 0 point indicating no pain while the score of 10 points reflecting maximum pain (Faux & Sheedy, 2008). Visual or verbal analog pain scales are useful for grading pain severity and tracking changes in pain over time. And headache disability instrument to more effectively guide patient care. The Headache Impact Test (HIT-6) and the Migraine Disability Assessment Scale (MIDAS) are two widely used disability scales (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

1.2 Physical exam

1.2.1 Comprehensive headache examinations are performed to help identify causes of headaches in order to provide proper treatment for each patient (Linder, 2007), consisting of the following physical examinations:

1.2.1.1 Cervical spine examinations

1.2.1.2 Skull-palpation of bones, muscles, and listening for bruits

1.2.1.3 Ear-external auditory meatus occlusion and motion

1.2.1.4 Temporomandibular joint-palpation and range of motion

1.2.1.5 Nerves-palpation of supraorbital, trochler, and occipital nerves, as well as cranial nerves IX-XII

1.2.1.6 Eyes-palpation and inspection

1.2.1.7 Sinuses-modified Muller's maneuver

1.2.1.8 Evaluation for increased intracranial pressure

1.2.1.9 Teeth-inspection, percussion, and palpation

1.2.1.10 Carotid arteries-listening for bruits and palpate

1.2.2 Patients with headaches should undergo a careful neurologic examination, including vital signs and evaluation of mental status, cranial nerves, motor function, sensation, coordination, gait, and reflexes. Most patients with headaches in the subacute phase after concussion or mild head injury should have a normal neurologic examination. Head CT or MRI has been recommended in patients whose headache worsen or persist longer than one week after concussion (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

1.2.3 The neck area should be thoroughly examined in order to find traces of the disease. Also, it might be necessary use x-rays, CT scan, or MRI scan to examine the spinal and neck areas in order to view any flexion or extension (Gladstone, 2009; Lanaerts & Couch, 2004).

1.3 Lab

1.3.1 Initial assessments of complete blood count, erythrocyte sedimentation rate, serum chemistry panel (including fasting glucose), and thyroid stimulating hormone may be useful for detecting occult but relevant medical comorbidities (Lane & Arciniegas, 2002).

1.4 Criteria

1.4.1 Acute posttraumatic headache develops with 7 day of injury, persists $\leq$ 3 months . Acute posttraumatic headaches are assessed

according to the criteria for diagnosis of acute posttraumatic headaches in mild traumatic brain injury patients (Linder, 2007; Formisano, Bivona, Catani, D'Ippolito, & Buzzi, 2009) consisting of the following:

A. Headache, no typical characteristics known, fulfilling criteria C and D

B. Head trauma with at least one of the following:

1. Either no loss of consciousness or loss of consciousness for < 30 minutes

2. Glasgow coma scale (GCS) ≥ 13

3. Symptoms and/or signs diagnostic of concussions

C. Headaches develop within seven days after head trauma

D. One of the following:

1. Headaches resolve within three months after head trauma

2. Headaches persist but three months not yet passed since head trauma

1.4.2. Type of headache and diagnostic criteria (Watanabe, Bell, Walker, & Schomer, 2012), consisting of the following:

Migraine without aura

A. At least 5 attacks fulfilling criteria B-D

B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)

C. Headache has at least 2 of the following characteristics:

Unilateral location

Pulsating quality

Moderate or severe pain intensity

Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)

D. During headache at least one of the following:

Nausea and/or vomiting

Photophobia and phonophobia

E. Not attributed to another disorder

Migraine with aura

A. At least 2 attacks fulfilling criteria B-D

B. Aura consisting of at least 1of the following but no motor weakness:

Fully reversible visual symptoms, including positive features (eg, flickering lights, spots, or lines) and/or negative features (ie, loss of vision)

Fully reversible sensory symptoms including positive features (ie, pain and needles) and/or negative features (ie, numbness)

Fully reversible dysphasic speech disturbance

C. At least 2 of the following:

Homonymous visual symptoms and/or unilateral sensory symptoms

least one aura symptom develops gradually over ≥ 5 minutes and/or different aura symptoms occur in succession over ≥ 5 minutes

Each symptom lasts ≥5 minutes and ≤ 60 minutes

D. Headache fulfilling criteria B-D above for migraine without aura begins during the aura or follows aura within 60 minutes

E. Not attributed to another disorder

Probable migraine (with or without aura)

Fulfills all but one of the criteria (A-D) previously listed for migraine headaches

A. At least 10 episodes occurring on < 1 day/month on average (< 12 day/year) and fulfilling criteria B-D

B. Headache lasting from 30 minutes to 7 days

C. Headache has at least 2 of the following characteristics:

Bilateral location

Pressing and/or tightening (nonpulsating) quality

Mild or moderate intensity

Not aggravated by routine physical activity such walking or climbing stairs

D. Both of the following:

No nausea or vomiting (anorexia may occur)

E. Not attributed to another disorder

Frequent episodic tension type At least 10 episodes occurring on ≥ 1 but < 15 day/month for at least 3 months (≥ 12 < 180 day/year) and fulfilling criteria B-E (as above for infrequent episodic tension-type headaches)

Cervicogenic headache

A. Pain, referred from a source in the neck and perceived in one or more regions of the head and/or face, fulfilling criteria C and D

B. Clinical, laboratory, and/or imaging evidence of a disorder or lesion within the cervical spine or soft tissues of the neck known to be or generally accepted as a valid cause of headache

C. Evidence that the pain can be attributed to the neck disorder or lesion based on at least one of the following:

Demonstration of clinical signs that implicate a source of pain in the neck abolition of headache after diagnostic blockade of a cervical structure or its nerve supply by using placebo or other adequate controls

D. Pain resolves within 3 months after successful treatment of the causative disorder or lesion.

1.4.3 The specific characteristics of posttraumatic headaches can be used to classify them into categories that have treatment implications (Erickson, & Theeler, 2012) , consisting of the following

Migraine characteristics include head pain that moderate or severe, unilateral or asymmetric, throbbing or pulsatile in quality, aggravated by or causes avoidance of routine physical activity, and accompanied by either nausea and vomiting or both light and sound sensitivity. The headache attacks last several hours to several days without treatment. Aura, a transient focal neurologic symptom that is most often visual in nature and precedes or

accompanies the headache, occurs in a minority of patients with migraine and is not required for a headache to be considered a migraine.

Cluster headache, paroxysmal hemicranias, hemicranias continua, and SUNC (short-lasting, unilateral, neuralgiformheadache attacks with conjunctival injection and tearing).

Cervicogenic headaches occur when pain is generated or referred from a source in the cervical spine, such as cervical discs, facet joints, or myofascial structures. Cervicogenic headache is often located in the occipital area or posterior head region but may also affect anterior head regions. The head pain can be unilateral or bilateral.

2. Posttraumatic Headache Management

Posttraumatic headache management consists of pharmacological treatments and non-pharmacological treatments (Sheftell, Tapper, & Bigal, 2007), which can be described as follows:

2.1 Non-pharmacological treatments for posttraumatic headaches are as follows:

2.1.1 Physical therapy and massage in patients with posttraumatic headaches can treat and reduce headaches (Lane & Arciniegas, 2002; Lew et al., 2006).

2.1.2 Active therapies such as aerobic/ cardiovascular exercises and stretching/strengthening should be encouraged. Exercises that involve relaxation and focus such as yoga or tai-chi help relieve headaches as well (Gladstone, 2009).

2.1.3 When multiple symptoms are present (headache, other somatic symptoms, cognitive symptoms, and/or psychological symptoms), consideration should be given to referral to appropriate specialists (Gladstone, 2009).

2.1.4 Treatment must be individualized according to the headache type. Associated symptoms should factor in the therapeutic choice, such as depression, fatigue, insomnia, etc. There is no controlled study addressing the specific efficacy of treatment in the subgroups of PTH such as migraine or tension-

type. A holistic approach should all be considered, but there is a clear lack of controlled studies. They include analgesics, prophylaxis, biofeedback, physical therapy, chiropractic treatment, massage, cold or hot thermal therapy, electrotherapy education, and cognitive behavioral therapy (Lenaerts & Couch, 2004).

2.1.5 Patients should be encouraged to do regular physical activities and to have an adequate sleep schedule, which means sleeping uninterrupted (if possible) at night for long enough to provide a sensation of self-restoration on waking. Patients should also avoid excessively stressful situations (Lenaerts & Couch, 2004).

2.1.6 A multidisciplinary approach is stressed in the treatment of posttraumatic headaches due to the multitude of associated symptoms (Seifert & Evans, 2010).

2.1.7 Biologically based interventions included a variety of biofeedback mechanisms, physical therapy and manual therapy, immobilization devices, ice, and injections. Behavioral interventions were cognitive behavioral therapy, relaxation techniques, biofeedback, and education (Watanabe, Bell, Walker, & Schomer, 2012).

2.1.8 Treatment alternatives are composed of physical therapy, manipulation, and psychological and behavioral management. Psychologic evaluation and behavior therapy, as well as lifestyle change and avoidance of medication overuse, are also important in management of posttraumatic headache (Lew, et al. 2006).

2.1.9 Cognitive behavioral therapy, relaxation therapy, and biofeedback these treatment modalities for migraine headache is well established. Physical modalities such as physical therapy, osteopathic manipulation therapy, acupuncture, and massage have not been fully evaluated for posttraumatic headache. Physical therapy is an important initial step in treating posttraumatic cervicogenic headache. Occipital nerve blocks can also alleviate cervicogenic headache and migraine (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012). cervicogenic headaches can be treated with injections at specific sites (Gladstone, 2009).

2.1.10 Treatment for posttraumatic headaches should also manage psychological factors, such as depression and anxiety, because these factors can cause chronic headaches (McGeeney, 2009).

2.2 Pharmacological treatments for posttraumatic headaches are as follows:

2.2.1 Medications used to reduce posttraumatic migraine headaches include Ergotamine, dihydroergotamine, triptans, Nonsteroidal anti-inflammatories, Acetaminophen, Ibuprofen 10 mg/Kg., and NSAID 10mg/Kg. (Gladstone, 2009; Lanaerts, & Couch, 2004; Lew et al., 2006; Linder, 2007).

2.2.2 Acute migraine medications include aspirin, acetaminophen, and nonsteroidal anti-inflammatory drugs such as naproxen, diclofenac, and ibuprofen, as well as a combination of products such as aspirin-acetaminophen-caffeine (Lucas, 2011). Medications used to treat acute migraine included ergotamine, dihydroergotamine, and the triptans (Lew, et al. 2006).

2.2.3 Medications used in treatments for the prevention of migraine headaches include calcium channel blockers; anticonvulsants such as topiramate, gabapentin or divalproex sodium; beta-blockers such as propranolol or nadolol; and tricyclic antidepressants such as amitriptyline and nortriptyline (Gladstone, 2009; Lanaerts & Couch , 2004; Lew et al., 2006).
Amitriptyline, propranolol, topiramate, and valproate have strong evidence of efficacy as prophylaxis for migraines and are first-line options for prevention of posttraumatic migraine headaches (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

2.2.4 The triptan class of medications should be tried in patients with migraine-type posttraumatic headaches that fail to respond adequately to NSAIDs. Triptan agents may be given incombination with an NSAID for increased effectiveness (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012). Triptans, the ergotaminees, and dihydroergotamine represent a class of treatment medications that are migraine specific (Lucas, 2011).

2.2.5 For common tension-type headaches, patients should receive antidepressants and muscle relaxants. Treatment for acute tension and migraine headaches should involve simple analgesics and non-steroidal anti-inflammatory medications (Lew, et al. 2006).

2.2.6 Medications used for the prevention of tension-type headaches include tricyclic antidepressants and muscle relaxers (Lanaerts & Couch, 2004). Tricyclic antidepressants, such as amitriptyline or nortriptyline, are appropriate first-line agents for prophylaxis of posttraumatic headaches resembling tension-type headache (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

2.2.7 The treatment of posttraumatic headaches with characteristics similar to chronic posttraumatic tension-type headaches involves the use of tricyclic antidepressants, which are the most commonly used medications (e.g. amitriptyline, nortriptyline, etc.) (Gladstone, 2009).

2.2.8 Medications used for the prevention of cluster headaches include steroids, calcium channel blockers, anticonvulsants, and lithium (Lanaerts & Couch, 2004).

2.2.9 Analgesics are considered the best option for treating low to moderate acute posttraumatic headaches. Analgesics comprise acetaminophen, naproxen, ibuprofen and acetylsalicylic acid, and anti-inflammatory agents (Gladstone, 2009; Lanaerts & Couch, 2004; Lew et al., 2006; Linder, 2007; Mcgeeney, 2009; Watanabe, Bell. Walker, & Schomer, 2012)

2.2.10 If patients have symptoms of nausea and vomiting, they should receive anti-emetics such as diphenhydramine, metoclopramide, prochlorperrazine, Compazine (dopamine antagonists) (Gladstone, 2009), metoclopramide, and chlorpromazine (Mcgeeney, 2009). Patients who experience nausea or vomiting during acute migraine attacks should be prescribed an antiemetic agent, such as metoclopramide, prochlorperazine, or promethazine (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

2.2.11 Medications used for the management of episodic headaches or episodic exacerbation headaches include non-steroidal anti-inflammatories, acetaminophen, acetylsalicylic acid, COX-2, isometheptene, and simple analgesics which can be effective in some patients (Gladstone, 2009; Lanaerts & Couch , 2004; Seifert & Evan, 2010; Vargas, & Dodick, 2012).

2.2.12 Divalproex sodium is effective in the treatment of chronic posttraumatic headaches (Mcgeeney, 2009).

2.2.13 The mainstay of treatment is to prevent chronicity by using prophylactic medications to adequately control the use of multiple medications in the acute stage, as well as to diminish the risks of the rebound phenomenon induced by medication overuse (Lew et al., 2006; Obermann, Keidel, & Diener, 2010).

2.2.14 The range of medications used included sumatriptan, intravenous ergotamine and metoclopramide, topical ketoprofen, indomethacin, valproic acid, amitriptyline, and propranolol (Watanabe, Bell. Walker, & Schomer, 2012)

2.2.15 NSAIDs are a good first choice for most types of posttraumatic headaches. NSAIDs are effective for migraine, tension-type headache, and cervicogenic headache (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

2.2.16 A variety of combination analgesic products are marketed for acute treatment of headache. Such products include butalbital/acetaminophen/caffeine (Fioricet), butalbital/aspirin/caffeine (Fiorinal), acetaminophen/isometheptene/dichloralphenazone (Midrin), and acetaminophen /aspirin/caffeine (Excedrin). These agents contain multiple active drugs and may be helpful for patients with infrequent attacks of mild-moderate migraine headache (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

2.2.17 Excedrin has evidence supporting its effectiveness in migraine, but the other agents have not been rigorously tested (Erickson, & Theeler, 2012).

2.2.18 Medications that help prevent headaches include calcium channel-blockers, beta-adrenergic blockers, anticonvulsants, antidepressants, and non-steroidal anti-inflammatory medications (Lane, & Arciniegas, 2002).

3. Monitoring

The clinician should then seek to gain an understanding of the frequency, duration, quality, and associated features of the headaches in the early post-injury period (Gladstone, 2009).

4. Education

Education concerning posttraumatic headaches and management of headaches can be given as follows:

4.1 Patients (and their family, referring physicians, or insurance company) should be educated that normal imaging does not imply that symptoms are meritless. It is also important to normalize the experience and educate the patients that headache is a very common consequence of a traumatic brain injury and that posttraumatic headaches do not imply brain injury per se as permanent symptoms should not be expected (Gladstone, 2009).

4.2 Education about headaches and headache management is also needed to engage patients in the process of recovery. Many patients with posttraumatic headaches rank obtaining an explanation of what has gone wrong as more useful and of greater concern than obtaining pain relief management (Lane & Arciniegas, 2002).

4.3 Patients should be given real expectations for recovery time framework, which may be days, weeks, or months (Gladstone, 2009).

4.4 Education about a healthy lifestyle is also beneficial to reduce the frequency and severity of posttraumatic headaches. Adequate stress management, coping strategies, sleep, and nutrition are all important components of a headache treatment program (Lane & Arciniegas, 2002: Level 7; Lenaerts & Couch, 2004).

4.5 Patients should be recommended to get adequate rest as well (Gladstone, 2009).

4.6 Patients should be advised to avoid crowded communities and stay in places with good ventilation, as well as to avoid areas with loud noises (Lanaerts & Couch, 2004).

4.7 Patients are recommended to avoid consumption of liquor, tea, coffee, monosodium glutamate, chocolate, and cigarettes (Lane & Arciniegas, 2002).

4.8 Patients should be scheduled for follow-ups on treatment (Gladstone, 2009).

4.9 Patients should be educated regarding their condition. The caretaker should explain some notions of the pathophysiology of posttraumatic headaches in terms that are easily understandable by the patients according to their educational background (Lenaerts & Couch, 2004).

4.10 Patients should be educated on anticipated results of prophylactic treatment (decreased headache frequency, severity, duration, and disability). Focus should be placed on symptom control and improvement of quality of life, while anticipation of a "cure" should be removed (Gladstone, 2009).

4.11 If patients have more headaches, they should return to see a doctor (Gladstone, 2009).

4.12 All patient with posttraumatic headaches education about their diagnosis and treatment plan. Patient should given clear instructions about the goals and proper uses of any prescribed medications. Lifestyle modification is a simple, yet often overlooked, technique. Patients should be encouraged to establish healthy meal, sleep, and exercise patterns. Patient may and identify specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches. specific trigger headaches that can be avoided. Caffeine overuse, smoking, and alcohol use can contribute to headaches (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012).

4.13 The goal of treatment is to educate the patients to treat the headache early on with effective, high-efficacy therapy (Lucas, 2011).

4.14 Education about mild traumatic brain injury and posttraumatic headaches is an important part of the treatment plan (Seifert, & Evans, 2010).

3.4 Recommendations

In the present study, management of headaches in patients with mild traumatic brain injury consisted of assessment, management, monitoring, and education.

1. In the study of Faux & Sheedy (2008), it was found that 15.35% of those who suffered a mild traumatic brain injury complained of posttraumatic headaches at three months. Thus, it would benefit health planners, administrators, and service providers to undertake a lager multicentered prospective trial of the incidence of posttraumatic headaches following mild traumatic brain injury with a 3month follow-up to examine prognostic factors, service utilization, and possible preventative interventions (Faux & Sheedy, 2008).

2. Most headache are multifactorial and involve a combination of central and peripheral mechanisms. Therefore, clinicians should be careful in classifying posttraumatic headaches before administration of therapy (Lew et al., 2006).

3. The mainstay of treatment is to prevent chronicity by using prophylactic medication to adequately control the use of multiple medications in the acute stage and to diminish the risk of rebound phenomena induced by overuse of medication (Lew et al., 2006).

4. Major pitfalls in the management of posttraumatic headache areimmobilization, traumatic treatment (chiropractice, local injections, etc.), medication overuse, and missing significant co-morbidity (Obermann, 2010).

5. Assessment of the new patients with headache should always include visualization of the optic disks and blood pressure measurement (Mcgeeney, 2009).

6. If aggressive treatment is initiated early, posttraumatic headache is less likely to become a permanent problem (Lane & Arciniegas, 2002).

7. Acute posttraumatic headaches following mild traumatic brain injury often resolves within a few weeks; therefore, the major category of posttraumatic headaches patients is represented by those who complain of chronic posttraumatic headaches that may add this symptom to the burden of TBI sequelae for years. Because of the poor knowledge of the pathophysiological mechanisms

underlying chronic posttraumatic headaches, an appropriate management is often unavailable (Formisano, 2009).

In conclusion, the mainstay to posttraumatic headache management in mild traumatic brain injury patients is prevention of chronic symptoms. Because chronic posttraumatic headaches cause deficits in memory, concentration, and thinking, management of posttraumatic headache in mild traumatic brain injury patients may increase the patients' quality of life.