MANAGEMENT OF POSTTRAUMATIC HEADACHE IN MILD TRAUMATIC BRAIN INJURY:EVIDENCE-BASED NURSING

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ABSTRACT

Posttraumatic headaches have impacted people who have suffered from decreased physical activities. Without proper treatment from the early stages, patients may develop chronic headaches. The effects of headache symptoms at the chronic stage have been found to interrupt daily lives, resulting in cognitive disorders and reducing quality of life.

This study was conducted with the objective of presenting recommendations for headache management in mild traumatic brain injury patients from the synthesis of knowledge according to the process of implementing research findings obtained from evidence-based practice by using the PICO framework in searching for evidence. The quality of the evidence-based practice was evaluated according to the study framework of Dicenso, Guyatt and Ciliska(2005). The evidence yielded by the search for evidence-based practice was published from 2000 to 2013. A total of 17 studies were found to match the scope of the study, i.e. 4 study and 13 academic articles. The results of the analysis and synthesis of the evidence-based practice were headache management guidelines for patients with mild traumatic brain injury comprising the following four topics: posttraumatic headache assessment, posttraumatic headache symptom management, monitoring of symptoms and educating patients.

The recommendations suggested by these research findings are as follows: the topics yielded by the analysis and synthesis of evidence-based practice can be developed into guidelines for posttraumatic headache management in patients with mild traumatic brain injury in order to be implemented in real situations and studies aimed at evaluation outcome and continual development of new knowledge.

KEY WORDS: MILD HEAD INJURY/ MID TRAUMATIC BRAIN INJURY/ POSTTRAUMATIC HEADACHE/ ASSESSMENT/ MANAGEMENT/ TREATMENT/ EVALUATION/ INTERVENTION/ THERAPY

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การจัดการอาการปวดศีรษะในผู้ป่วยบาดเจ็บศีรษะเล็กน้อย : การพยาบาลตามหลักฐานเชิงประจักษ์
MANAGEMENT OF POSTTRAUMATIC HEADACHE IN MILD TRAUMATIC BRAIN INJURY: EVIDENCE-BASED NURSING

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บทคัดย่อ

อาการปวดศีรษะหลังการบาดเจ็บมีผลกระทบต่อตัวบุคคล พบว่าทำให้เกิดความทุกข์ทรมาน และทำให้เกิดความสามารถในการทำกิจกรรมลดลง หากไม่ได้รับการจัดการที่เหมาะสมตั้งแต่ระยะแรกจะส่งผลให้ผู้ป่วยเกิดอาการปวดศีรษะเรื้อรัง ซึ่งผลกระทบของอาการปวดศีรษะในระยะเรื้อรังพบว่ามีผลรบกวนการดำเนินชีวิตประจำวัน มีผลทำให้บกพร่องในความคิด และคุณภาพชีวิตของผู้ป่วยลดลง

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อเสนอแนะแนวทางจัดการอาการปวดศีรษะในผู้ป่วยบาดเจ็บศีรษะเล็กน้อยจากการสังเคราะห์ความรู้ตามกระบวนการใช้ผลการวิจัยที่ได้จากหลักฐานเชิงประจักษ์โดยใช้กรอบของ PICO ในการสืบค้น ประเมินคุณภาพตามกรอบการศึกษาของ Dicenso, Guyatt และ Ciliska (2005) ผลการสืบค้นหลักฐานเชิงประจักษ์ที่ตีพิมพ์ระหว่างปี ค.ศ. 2000-2013 และตรงกับขอบเขตของการศึกษาได้จำนวนทั้งหมด 17 เรื่อง ประกอบด้วยงานวิจัยจำนวน 4 เรื่อง และบทความวิชาการจำนวน 13 เรื่อง ผลการวิเคราะห์และสังเคราะห์หลักฐานเชิงประจักษ์ ได้ประเด็นแนวทางการจัดการอาการปวดศีรษะในผู้ป่วยบาดเจ็บศีรษะเล็กน้อย 4 ประเด็น คือ การประเมินอาการปวดศีรษะหลังการบาดเจ็บ การจัดการดูแลอาการปวดศีรษะหลังการบาดเจ็บ การติดตามอาการ และการให้ความรู้

จากการศึกษาครั้งนี้มีข้อเสนอแนะคือ สามารถนำประเด็นจากการวิเคราะห์และสังเคราะห์หลักฐานเชิงประจักษ์ ไปพัฒนาเป็นแนวทางการจัดการอาการปวดศีรษะในผู้ป่วยบาดเจ็บศีรษะเล็กน้อย เพื่อใช้ในสถานการณ์จริงและศึกษาวิจัยเพื่อประเมินผลลัพธ์และพัฒนาความรู้ใหม่ๆ อย่างต่อเนื่อง

130 หน้า

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CHAPTER I
INTRODUCTION

1.1 Background and Significance of Clinical Problem

WHO has predicted that by 2020, traffic accidents will be the third leading cause of the global burden of diseases and injuries (Yeoman, Pattani, Silicocks, Owen, & Fuller, 2011). In Thailand, accidents have been found to be the third leading cause of deaths after cancer and cardiovascular disease. In 2011, the total number of severe accidents related injuries was 80,962 people, while the total number of deaths was 4,534. Most of the casualties were in the age group of 15-19 years, accounting for 12,816 people (Annual Epidemiological Surveillance Report, 2011). In 2011 and 2012, the total number of deaths caused by traffic accidents was equal to 14,062 and 14,064. Of these, 11,094 and 11,066 were males, and 2,968 and 2,998 were females (Bureau of Health Policy and Strategy, Ministry of Public Health, 2011 and 2012). The estimation of WHO as well as the statistics recorded in Thailand have shown that the incidence is rising.

Traumatic brain injury is a significant problem worldwide and is one of the major causes of morbidity and mortality (Juul, Duch, & Rusmussen, 2009; Metting, Rodiger, Stewart, Oudkert, Keyser, & Naalt, 2009; Cassidy et al., 2004). Furthermore, traumatic brain injury has significant social and economic impacts, particularly on young males aged 15-24 years who constitute the most common group affected. Furthermore, traumatic brain injury has impacts on important aspects of daily life from work to routine domestic activities and leisure pursuits (Mccartan, Fleming, Motherway, & Grace, 2008). According to the World Health Organization, it was estimated in 2013 that the numbers of patients with traumatic brain injuries worldwide were about of 54-60 millions per year on average. In Ireland, traumatic brain injury is a leading cause of death and disability in young adults. More than 11,000 patients with traumatic brain injury are admitted to the hospital in Ireland annually (Mccartan, Fleming, Motherway, & Grace, 2008). In Taiwan, traumatic brain injury, a significant

public health problem with an incidence of 160,000-200,000 people, produces more than 8000 deaths annually (Yang, Hua, Tu, & Huang, 2009). As for Thailand, traumatic brain injuries in the country are stemming from traffic accidents, head injuries classified as organ injuries making up 30% of the total (Bureau of Health Policy and Strategy, Ministry of Public Health, 2007).

For industrialized countries such as the United States of America, the estimates of the relative causes of traumatic brain injury are as follows: motor vehicle accidents (45%), falls (30%), occupational accidents (10%), recreational accidents (10%), and assaults (5%) (Seifert & Evans, 2010; Obermann, Keidel, & Diener, 2010). The financial cost directly caused by traumatic brain injury is, estimated to be over 60 million USD per year, (Juul, 2009). In Thailand, the motorcycle is the most important cause of traumatic brain injuries, followed by truck (6.80%), and 3-wheel bikes (4.06%), respectively. Furthermore, in terms of the affected persons, the drivers were mostly injured (73.79%), followed by passengers (21.51%) and pedestrian (4.70%), respectively. The head injury is considered the most traumatized organ, accounting for 31.75% (Bureau of Health Policy and Strategy, Ministry of Public Health, 2007). In Europe, it has been documented that approximately one million patients have traumatic brain injury that required hospitalization (Chong, 2009). Moreover, there are approximately 1.4 million incidents of traumatic brain injury reported in the United States every year (Centers for Disease Control and Prevention, 2006; Chong, 2009; Jantzen, 2010; Obermann, 2010; Seifert & Evans, 2010). The majority of the cases, ranging from 80% to 90%, are classified as mild traumatic brain injury cases (Metting, 2009; Jantzen, 2010). WHO, in 2013 stated that 95 % of patients who have suffered traumatic brain injury have mild traumatic brain injuries. Other research studies have concluded that patients who suffer from physical disturbances after mild traumatic brain injury lack of productive capabilities. This eventually causes a large burden on the economy of the country (Yang, Hua, Tu, & Huang, 2009).

Head injury is considered the most traumatized organ, accounting for 30% of all accidents among those wearing a helmet and 50% among those not wearing a helmet (Office of Epidemiology, Department of Disease Control, Ministry of Public Health, 2011). In 2011, it was reported that in Thailand patients with traumatic brain injuries from the use of motorcycle helmets account for 95% of mild traumatic brain

injury patients (Bureau of Health Policy and Strategy, Ministry of Public Health, 2011).

Packard (2008) has summarized the definition of mild traumatic brain injury from the Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine (ACRM) and the World Health Organization Collaborating Center Task Force on Mild Traumatic Brain Injury. The ACRM has defined mild traumatic brain injury as a trauma that induces physiologic disruption of brain function, as manifested by at least one of the following:

1. Any loss of consciousness;

2. Any loss of memory of events immediately before or after the accident;

3. Any alteration in mental state at the time of the accident (feelings dazed, disoriented, or confused) ; or,

4. Focal neurological deficits that may or may not be transient.

The period of loss of consciousness should last 30 minutes or less after the injury. After 30 minutes, the initial Glasgow Coma scale (GCS) score is 13 to 15. It is worth noting that post-traumatic amnesia should not last longer than 24 hours.

The World Health Organization Collaborating Center Task Force on Mild Traumatic Brain Injury has defined mild traumatic brain injury as an acute brain injury resulting from mechanical energy to the head from external physical forces. Operational criteria for clinical identification include the following:

1. one or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less after the injury, post-traumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, seizure, and intracranial lesion not requiring surgery; and

2. Glasgow Coma Scale score of 13 to 15 at 30 minutes after the injury or later upon presentation for health care. These manifestations of mild traumatic brain injury must not be due to drugs, alcohol, medications, other injuries (such as, systematic injuries or intubation), other problems (such as, psychological trauma, language barrier or coexisting medical conditions), or penetrating craniocerebral injury.

The common features in all of these definitions seem to include one or more of the following: an alteration of mental status after the injury, any memory dysfunction, loss of consciousness for less than 30 minutes, and/or observed signs of neurologic dysfunction. Most include a GCS score of 13 to 15 at 30 minutes after the injury.

In 2011, Schwedt & Buzzi summarized traumatic brain injuries, stating that the traumatic brain injury is classified as mild when there is no associated loss of consciousness or loss of consciousness lasting less than 30 minutes, with a Glasgow Coma Scale (GCS) of at least 13,and with no symptoms and/or signs of concussion

In summary, mild traumatic brain injury is an acute brain injury resulting from mechanical energy to the head from external physical forces (Chong, 2008). With the presence of head trauma, a Glasgow Coma Scale (GCS) ranges from of 13 to 15, and at least one of the following four criteria is present: 1) any period of loss of consciousness; 2) any loss of memory for events immediately before or after the accident; 3) any alteration in mental state at the time of accident (for example, feeling dazed); or 4) focal neurological deficit(s) that may or may not be transient (Gravel et al., 2013).

In general, when patients have sustained mild traumatic brain injuries, they are subject to post-concussion syndromes, confusion, nausea, dizziness, headaches, tinnitus, hearing loss, blurred vision, insomnia, light and noise sensitivity, diminished sense of smell, cognitive impairment and attention, personality change, irritability, anxiety, and depression (Chong, 2008; Lainez & Esquera, 2011; Linder, 2008; Yang, Hua, Tu, & Huang, 2009). Posttraumatic headaches occur in 30% to 90% of mild traumatic brain injury cases, and they are considered one of the post-concussion syndromes encountered in mild traumatic brain injury patients (Channell, Mueller, & Hahn, 2008; Evans, 2006; Michael, 2009; Obermann, 2010; Seifert & Evans, 2010). In other words, posttraumatic headaches are more commonly found in mild traumatic brain injury cases rather than in severe traumatic brain injury cases (Couch, Lipton, & Stewart, 2009; Channell, 2009; Obermann, 2010; Solomon, 2009). A more recent study has found that the overall severity of the traumatic brain injury was inversely proportional to the headache (severe headache was present in 33% of severe traumatic brain injury cases and in 72% of mild traumatic brain injury cases) (Evans, 2007). The

impacts of headaches following injuries on persons are found to have caused suffering and disability, lost productivity, decreased quality of life, and increased health care costs (Aguggia, Cavallini & Varetto, 2006; Erickson, Neely, & Theeler, 2010). In terms of impacts at the chronic stage, chronic posttraumatic headaches are found to have impacts that disturb the daily life of patients and cause cognitive impairment while decreasing the quality of life of patients (Chong, 2008). This was found to be consistent with the studies of Boake, et al. (2005) and Nolin (2006) who found posttraumatic headache to have decreased working productivities, causing great impacts on patients in their daily life, occupations, and personalities, thereby decreasing quality of life of patients, which often interferes with interpersonal relationships among patients, families, and society, while also having impacts on the economy and society in general (Aguggia, 2006). Research conducted by Mccartan, Fleming, Motherway, & Grace (2008) to assess the management and outcome in 216 patients of working age who were admitted with traumatic brain injury found that 86% of patients with mild traumatic brain remained unfit for work after one year (Mccartan, Fleming, Motherway, & Grace, 2008). In general, mild traumatic brain injury patients tend to increase in numbers, and the condition has direct effects on patients who suffer from headaches which become an obstacle in their life and work, which, in turn, decreases their quality of life.

According to the statistics on patients with traffic accidents seeking treatment at the Accident and Emergency Department between 2006 and 2013 of Klang Hospital, which is under the supervision of the Medical Service Department, Bangkok Metropolis, there were 3,009, 3,041, 2,697, 2,769, 2,834, 2,855, 2,994 and 2,969 patients who suffered from traffic accidents, respectively. Between 2006 and 2008, 18, 10, and 10 patients died from the accidents, respectively (Statistics of Klang Hospital, 2006 to 2008). In addition, according to statistics on traumatic brain injury patients seeking treatment at Klang Hospital, Medical Service Department, Bangkok Metropolis, from 2006 to 2013, the numbers of traumatic brain injury patients were 168, 172, 254, 186, 205, 230, and 340, respectively (Statistics of Klang Hospital, 2006 to 2013). According to the aforementioned statistics, it can be seen that the numbers of patients with traumatic brain injuries tend to increase. From medical records of the total numbers of traumatic brain injury patients seeking treatment at

Klang Hospital, most of them patients were found to have mild traumatic brain injury, accounting for 82.85% and 79% in the fiscal years 2008 and 2009, respectively (Statistic of Medical Records of Klang Hospital, 2008 to 2009 fiscal years). Furthermore, according to a review of 107 medical records of mild traumatic brain injury patients (GCS = 13 to 15) in the fiscal year 2009, it was found that there were 46 patients with acute posttraumatic headache (PTH), making up 43% of the total cases. Of these patients, six of them, or 13.04%, had to return to the hospital with acute posttraumatic headaches within seven days (Statistics of Medical Records, Klang Hospital, 2009 fiscal year). Based on the aforementioned statistics, it is evident that posttraumatic headaches can be found in mild traumatic brain injury patients and that acute posttraumatic headaches are also a significant cause of re-hospitalization. Apart from having physiological and psychological impacts on patients, acute posttraumatic headaches also have other impacts on patients including loss of income due to hospitalization, increased medical expenses, along with increasing expenses in medical treatment systems (Erickson, Neely, & Theeler, 2010).

Mild Traumatic Brain Injury

Mild traumatic brain injuries are caused by force from objects acting on the head or acceleration/deceleration. Patients may not be directly injured on the head (Hughs, Jackson, Mason, Beery, Hollis, & Yates, 2004), but may be injured by rotation forces (Gladstone, 2009; Linder, 2007), resulting in axonal shearing (Jantzen, 2010; Lenaerts & Couch, 2004; Silver, 2005; Linder, 2007), tissue injuries (Obermann, 2010), and stretching vessels (Packard, 2008, 2010). When patients have sustained mild traumatic brain injuries, they are subject to post-concussion syndromes, such as confusion, nausea, dizziness, headaches, tinnitus, hearing loss, blurred vision, insomnia, light and noise sensitivity, diminished sense of smell, impaired concentration and attention, personality change, irritability, anxiety, and depression (Chong, 2008; Linder, 2008). For about 80% of mild traumatic brain injury patients, the aforementioned symptoms will improve within three months after sustaining injuries (Arciniegas, 2011; Bergman, 2009). A review of 1,670 patients from studies has revealed that chronic headaches occur in 58% of patients with traumatic brain injury (Erickson, Neely, & Theeler, 2010). In brief, headache is the most commonly

found symptom after traumatic brain injury (Oberman, 2010). Although most posttraumatic headaches resolve within six to 12 months after the injury, approximately 18% to 33% of posttraumatic headaches persist for more than one year (Lew et al., 2006).

The pathophysiology of mild traumatic brain injury and associated post traumatic headaches are believed to be partly neurometabolic in origin. Release of excitatory neurotransmitters such as aspartate, glutamate, and acetylcholine may serve as a potential substrate for mild traumatic brain injury (Evans & Seifert, 2010). Acute pain following head (+/- neck) trauma may derive from injuries (laceration, traction, torsion, compression, or fracture) to the scalp, skull, dura, specific nerves of the head and neck (i.e., supraorbital, infraorbital, and occipital nerves), cervical discs, facets, ligaments, muscles, sympathetic nerve fibers along the arterial vessels, and/or the temporal mandibular joint. Acute pain frequently derives from pain impulses generated from nociceptive afferents from these affected areas; ascending pain information may enter the central nervous system via C fibers of upper cervical cord dorsal rami or via the spinal nucleus of the trigeminal-vascular system that can converge and ascend rostrally. Clinically, this leads to referred pain and poor localization of pain to the specific site of head injury (Gladstone, 2009). Dysfunction of pain-transmitting and modulating structures and trigeminal-vascular system activation are thought to be involved in posttraumatic headache (Lenaerts & Couch, 2004).

Not only is posttraumatic headache a result of nervous, musculoskeletal, and vascular injuries, but patients with chronic posttraumatic headaches also demonstrate psychological issues such as anxiety, depression, anger, and personality change. Psychological problems may trigger or contribute to a vicious cycle of pain and emotional problems. Alternatively, persistent headaches may perpetuate emotional problems. In addition, mental fatigue and cognitive impairment such as slowed information processing, impaired memory, and impaired problem-solving ability have also been reported in patients with posttraumatic headaches (Lew, 2006).

Assessments of mild traumatic brain injury patients can be done based on levels of consciousness following the injury. In this study, the instrument used to assess the severity of injuries was the Glasgow Coma Scale (GCS) score with a

scoring range of 15 points divided into three levels consisting of mild traumatic brain when there was no associated loss of consciousness or loss of consciousness lasting less than 30 minutes, a Glasgow Coma Scale (GCS) of at least 13, and symptoms and/ or signs of concussion. Head injuries are considered moderate or severe when there was loss of consciousness for longer than 30 minutes, GCS less than 13, post-traumatic amnesia lasting longer than 48 hours, and/or imaging demonstration of traumatic brain injury concussion (Schwedt & Buzzi, 2011). To determine that the patients had mild traumatic brain injury, the assessment criteria with scores ranging from 13 to 15 points were employed (Gravel, 2013).

Posttraumatic Headache (PTH)

The existing literature has suggested that posttraumatic headache is similar to non-posttraumatic headache in both pathogenesis and presentation (Tatrow, Blanchard, & Silverman, 2003; Gladstone, 2009). The International Headache Society Classification of Headache Disorders, Second Edition, (ICHD-2), has defined posttraumatic headaches as a secondary headache that develops within seven days of head trauma (or within seven days of regaining consciousness after head trauma) (Formisano, Bivona, Catani, D'Ippolito, & Buzzi, 2009; Linder, 2007; Mcgeeney, 2009). Diagnostic criteria for acute posttraumatic headache attributable to mild traumatic brain injury (Erickson, Neely, & Theeler, 2010; Erickson, & Theeler, 2012; Gladstone, 2009; Formisano, Bivona, Catani, D'Ippolito, & Buzzi, 2009; Lainez, & Pesquera, 2011; Schwedt, & Buzzi, 2011) are as follows:

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

B. Head trauma with all of the following:

1. Either no loss of consciousness or loss of consciousness of a duration less than 30 minutes

2. Glasgow coma scale (GCS) scores of 13 or higher

3. Diagnostic symptoms and/or signs of concussion

C. Headaches that develops within seven days after head trauma

D. One of the following:

1. Headache that resolves within three months after head trauma, or

2. Headache that persists, but within three months since head trauma.

Furthermore, characteristics of posttraumatic headaches are divided into two types consisting of acute posttraumatic headaches and chronic posttraumatic headaches with differences in periods of recovery because chronic posttraumatic headaches will last for longer than three months.

As regards characteristics of posttraumatic headaches, there are no unique or distinctive clinical features of posttraumatic headaches. In terms of location, posttraumatic headaches may be localized to the site of the head injury or it may be hemicranial, bilateral, or holocranial. With regard to the quality of pain, posttraumatic headaches can be dull, pressing, throbbing, stabbing, burning, and a plethora of other adjectives. In terms of duration and frequency of symptoms, posttraumatic headaches can be daily and continuous 24/7, daily and long-lasting (> 4 hours) but not continuous, daily but short-lasting (recurring paroxysmally lasting seconds or minutes), episodic and long-lasting (> 4 hours), or episodic and short-lasting. (Gladstone, 2009). According to the assessment of headache severity, 8.9% of the patients were found to have low levels of headaches, 26.89% of the patients were found to have moderate headaches, and 63.4% of the patients were found to have severe headaches (Gurr & Coetzer, 2005).

According to Seifert and Evans (2010), the tension-type posttraumatic headaches account for 85% of reported posttraumatic headaches. They can occur in a variety of distributions, including a generalized, muchal-occipital, bifrontal, bitemporal, cap-like, or headband location. The headache, which may be constant or intermittent with varying duration, is usually described as pressure, tightness, or dull aching. It may be present on a daily basis. Recurring attacks of migraine-like headaches (with and without aura) can result from mild traumatic brain injury. After mild traumatic brain injury, patients of all ages can develop a variety of transient neurological sequelae that are not always associated with headaches and are perhaps due to vasospasm. Five main clinical types are recognized: hemiparesis, somnolence, irritability, and vomiting; a confusional state; transient blindness, often precipitated by occipital impacts; and brainstem signs. Cluster-like headache is an extremely rare entity (lifetime prevalence of 1%), and it is infrequently reported in the medical

literature. Cluster headache is a primary headache disorder classified as one of the trigeminal autonomic cephalgias. Acute attacks involve the trigeminovascular system with associated unilateral excruciating pain. These events typically include the autonomic symptoms of lacrimation, ptosis, conjunctival injection, nasal stuffiness, and rhinorrhea. Whiplash and cervicogenic headache and neck injuries commonly accompany head trauma and can produce headaches. The specific mechanism involves the merging of trigeminal and cervical afferents in the trigeminocervical mucleus. Typical pain includes throbbing and/or pressure-like pain originating in the occipital region, migrating anteriorly to involve the temporoparietal areas in a unilateral distribution. Posttraumatic cervicogenic headaches are also commonly associated with whiplash injuries. Whiplash is a sudden acceleration then deceleration of the neck resulting in pain at the time of trauma. The triad of neck pain, restriction/neck mobility, and headache are the major constituents of whiplash syndrome (Seifert & Evans, 2010).

It is worth noting that the aforementioned posttraumatic headaches are more frequent after mild traumatic brain injury than after severe injury, even though between 30% and 90% of mild traumatic brain injury can lead to posttraumatic headaches (Channell, Mueller, & Hahn, 2009; Gladstone, 2009; Vargas & Dodick, 2012).

Lew and colleagues (2006) conducted a study to explore characteristics and incidence of posttraumatic headaches and reported that tension-type headaches were the most frequently discovered form of headaches (ranging from 6.9% to 85.7%, with the mean of 33.6%), followed by migraine-like headaches (ranging, from 1.9% to 40.7%, with the mean of 28.6%), and mixed or unclassified headaches (ranging from 4.2% to 36.5%) (Lew et al., 2006). Furthermore, in the study carried out by Gurr and Coetzer (2005) with 41 traumatic brain injury patients aged 22-72 years with posttraumatic headache, it was found that 58.5% of the patients had tension-type headaches, 17.1% had migraine-like headaches, and 9.8% of the patients had both tension-type and migraine-like headaches. The average period of headaches was found to be at 10.46 hours per day and 14 days per month. As regards characteristics of headaches, 28.81% were tight tension headaches, 18.64% were throbbing headaches, 15.25% were stabbing and sharp pain headaches, and 5.09% were dull pain headaches.

There were also headaches with more than two characteristics. From the assessment of headaches, headache severity was ranged from low to moderate levels (Lew et al., 2006), and it was found to be heavy during the period during the first one to three days after injury with symptoms gradually improving within seven days after the injury (Mihalik, Guskiewicz, Mann, & Shields, 2007).

A study carried out by Sarmento and colleagues (2009) with 17 mild traumatic brain injury patients aged 20-66 years with posttraumatic headaches revealed that nine patients (53%) had acute posttraumatic headache, while eight patients (47%) had chronic posttraumatic headaches. As for onset, 11 of the patients began to develop headaches on the first day after the injury, three patients had headaches during the second and fourth days after the injury, and three patients had headaches on the seventh day after the injury. In terms of duration, nine patients had headaches for a month, four patients continued to have headaches after three to six months, two patients had headaches for six months to a year, and two patients had headaches for longer than a year. The mean value for the headache incidence was 13.4 days per month. Furthermore, with regard to the type of headache, eight patients (47%) were found to have tension-type headaches, five patients (29%) were found to have migraine-like headaches without auras, one patient (6%) was found to have cervicogenic headaches, one patient (6%) was found to have hemicranias continual headaches, and two patients (12%) were found to have a combination of tension-type headaches and migraine-like headaches without auras. In addition, according to the study of Romrudee Kliangda (2009) who investigated the experiences of posttraumatic headaches in 88 mild traumatic brain injury patients, 32.5% of the patients described symptoms of throbbing headaches, 27.5% described dull headaches, 47.5% described bitemporal headaches, 22.5% described generalized headaches, and 20% described central pain headaches. Moreover, regarding frequency, 50% of the patients had headaches once or twice a day, whereas 32.5% had headaches three to five times per day (Romrudee Kliangda, 2009).

Assessment of Post Traumatic Headaches

The evaluation of posttraumatic headache involves elicitation of history with an inquiry of the exact mechanism of the injury and a sense of the biomechanical

force applied. Besides this, immediate post-injury symptoms should be inquired, including loss of consciousness, alteration of consciousness, confusion/loss of awareness, amnesia, dizziness/vertigo, nausea, vomiting, and visual disturbances. Assessments of the frequency, duration, quality, and characteristics of headaches and screening of physiological diseases involve assessments of headache severity (Gladstone, 2009); assessments of factors causing headaches consisting of the musculoskeletal, vascular, neural and biomechanics factors; and assessments of stress and anxiety of patients because these factors increase headaches (Lew, 2006). Comprehensive headache examinations are performed to help build clarity regarding the cause of headaches in order to provide proper treatment for each patient consisting of the following physical examinations (Linder, 2007):

1. Cervical spine examination
2. Skull-palpation of bones, muscles, and listening 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's maneuver
8. Evaluation for increased intracranial pressure
9. Teeth-inspection, percussion, and palpation
10. Carotid arteries-listen for bruits and palpate

According to the study of Faux and Sheedy (2008), the instrument used to assess pain levels of headaches was the Visual Analog Scores of Pain with pain scores ranging from 0 to 10 points, with 0 point meaning no pain and 10 points meaning maximum pain (Faux & Sheedy, 2008). Sarmento and colleagues (2009) studied tests by using spectroscopy magnetic resonance imaging (MRS) in 17 mild traumatic brain injury patients with posttraumatic headaches and 12 members of the control group. Use of proton MRS estimated the metabolic ratios of N-acetylaspartate (NAA) and choline (Cho), relative to creatine (Cr). When compared with controls, individuals with posttraumatic headaches following mild traumatic brain injuries had reduced values of NAA in the right (1.64 ppm vs. 2.05 ppm, $p = .012$) and left anterior regions

of the frontal lobe white matter (1.52 ppm vs. 2.10 ppm; p = .024); anterior (1.52 ppm vs. 1.78 ppm; p=.0155**)** and posterior medical region of the frontal lobe (1.6 ppm vs. 2.07 ppm; p=.0045**)**; and medial region of parietal lobes (1.76 ppm vs. 2.23 ppm; p=.0065). Contrary to the controls, Cho measures were statistically increased in the posterior region of the white matter of the side frontal lobe (1.18 ppm vs. 0.99 ppm: p=.0095), the anterior medial region of the frontal lobe (1.20 ppm; vs. 1.07 ppm; p = .0265), and the medial region of the parietal lobes (0.92 ppm vs. 0.65 ppm; p = .0005). Therefore, it can be summarized that proton MRS may be useful as an imaging marker of posttraumatic headaches following mild traumatic brain injury. It was found that NAA will be reduced and Cho will increase in mild traumatic brain injury patients with post traumatic headache (Sarmento et al., 2009).

Management for Posttraumatic Headaches

The mainstream, of treatment is to prevent chronic headaches (Gladstone, 2009; Packard, 2005). It is noteworthy that management of headaches in traumatic brain injury patients may be difficult and complex because there are many possible underlying factors, including musculoskeletal, vascular, visceral, neural, and iatrogenic causes. At the same time, the consequences of delayed diagnosis or treatments of headaches caused by psychological factors may aggravate the conditions (Lew et al., 2006). Therefore, before providing any treatment, specialist doctors should collect data to systematically assess physiological conditions and symptoms with full coverage. Comprehensive patient assessments will help treatments properly achieve success (Lenaerts & Couch, 2004).

Pharmacological treatments for posttraumatic headaches should be provided according to pain discovered by providing pain relief medications and NSAIDs. Most headache treatments are divided into treatments for tension-type headaches and migraine-like headaches. Tension-type headache patients receive pain relievers and NSAIDs, such as paracetamol, ibuprofen, muscle relaxants, and antidepressants such as amitriptyline, so treatments can have positive outcomes (McGeeney, 2009; Lew et al., 2006). For patients with migraine-like headaches, the first option consists of tricyclic antidepressants, such as anitriptyline, nortriptyline, and

calcium channel blockers such as propranolol or nadolol, and anticonvalsants, such as topiramate, gabapentin, or divalproex sodium (Lew et al., 2006).

Non-pharmacological treatment involves behavioral and psychological management combined with pharmacological treatments aimed at promoting positive outcomes of headache management (Hall Ryan et al., 2005). Non-pharmacological treatment involves physical therapy and manipulation, biofeedback, relaxation technique, behavioral therapy, Anesthetic blockade, botulinum toxins, etc. (Lew et al., 2006). As regards non-pharmacological treatments with anesthetic blockade and botulinum toxins, nerve block by local anesthetics has been advocated to relieve various kinds of primary headaches. However, the mechanisms remain unclear (Lew et al., 2006).

According to the literature review of Lew and colleagues (2006), there have been no studies conducted on the effects of botulinum toxins in the treatment of posttraumatic headaches as well as non-pharmacological treatments with psychotherapy. Psychotherapy generally enables patients with chronic posttraumatic headaches to receive counseling. The provision of education regarding mild traumatic brain injuries and headaches for patients is important for treatment (Seifert & Evan, 2010). Headaches resulting purely from musculoskeletal and biomechanical dysfunction may be relieved with appropriate physical therapy intervention. Because the peripheral contribution is variable in each patient, there is still insufficient evidence to either support or refute the effectiveness of physical therapy and spinal manipulation on treatment of primary headaches. Moreover, there is no study investigating the effects of physical therapy and manipulation on posttraumatic headaches (Lew et al., 2006).

In 2009, Romrudee Kliangda reported that more than half of the patients in her study (57.5%) were found to have selected more than one method of headache management. They were taking pain relievers and sleeping (27.5%) which were able to relieve headache at a moderate degree occurring more than five minutes to less than 60 minutes. In terms of reasons for selecting headache management methods, close to two-thirds of the patients (30%) were found to have followed recommendations given by healthcare personnel. With regard to persons who helped with headache management, most patients (80%) were found to have managed headaches by

themselves. In terms of frequency in complying with methods selected for headache management, patients experienced the headaches more than ten times per week at most. Pain relief medication, head massage, and sleeping were found to be effective methods that helped reduce headaches in less than five minutes, 15 minutes, and 30 minutes, respectively. Use of more than one method was the most frequently selected method. Patients most frequently chose the method of taking pain relief medication and sleeping, which was able to moderately relieve headaches in less than five minutes up to more than 60 minutes. In addition, taking pain relief medication with head massage and sleeping were found to have reduced headaches in less than five minutes, 10 minutes, and 10-60 minutes, respectively.

With regard to mild traumatic brain injury patients, 30% to 90% of the patients in this group develop posttraumatic headaches (Obrmann, 2010; Seifert & Evan, 2010), which is the most frequently encountered symptom of all post-concussion syndrome. Posttraumatic headaches occur within seven days after injuries, and most will disappear within three months (Seifert & Evan, 2010). However, some patients continue to have chronic posttraumatic headaches for years after sustaining injuries (Lew et al., 2006; Seifert & Evans, 2010), thereby reducing quality of life for these patients (Aguggia, 2006; Chong, 2008). Posttraumatic headaches management consists of pharmacological and non-pharmacological methods (Gladstone, 2009; Lew et al., 2006). The major goals of management of posttraumatic headaches are to abort headache attack, decrease headache frequency, reduce disability, and prevent chronic posttraumatic headaches (Erickson, Neely, & Theeler, 2010). It is worth noting that successful headache management relies on timely and appropriate headache management by health care providers. If patients do not receive correct appropriate assessment and management, they will suffer the effects of headaches on their lives, including long-term sufferings and poorer quality of life.

1.2 Clinical Problem under Study

Headaches in mild traumatic brain injury patients have both physiological and psychological effects. Acute posttraumatic headaches occur in 80% of the people who have had traumatic brain injury (Lenaerts & Couch, 2004). Posttraumatic

headaches are also an important public health issue due to their associated disability and often refractory clinical course (Evans & Seifert, 2010). According to reviews of the medical records of 107 mild traumatic brain injury patients (GCS = 13-15) who sought treatment at Klang Hospital, Medical Service Department, Bangkok Metropolis, in the fiscal year 2009, 46 patients with acute posttraumatic headaches (PTH) were found, making up 43% of the total. Of these, six patients, or 13.04% had to be re-hospitalized with acute posttraumatic headaches (Statistics of Medical Records of Klang Hospital, fiscal year 2009).

Based on the investigator's reviews of medical records and personal experience working in the male surgical ward, mild traumatic brain injury patients seeking treatments at the hospital generally receive closed observe and observation of symptoms. Patients are assessed for vital signs and Glasgow Coma scale scores. They are also generally kept for observation for a minimum of 12 hours. If patients are found to have no abnormal symptoms with Glasgow Coma scale scores of 15 points within 24 hours after admission, they are discharged from the hospital. If the patients have acute posttraumatic headache, they will be treated with pain relief medication according to the treatment plans of doctors. Cold compresses will also be used around the injured area of the head. According to personal conversations with patients after taking pain relief medication and cold compresses, the patients tend to report that their symptoms are only slightly alleviated. They continue to have headaches periodically, which causes suffering, stress, and anxiety from the symptoms that have occurred while also causing insomnia. In addition, the fact that patients have to be re-hospitalized causes them to lose income and suffer from the burden of incurring treatment expenses. For example, patients must have a CT scan for investigation, which can be expensive for some patients. Furthermore, there is no clearly defined practice guideline in use at the patient wards for assessments and management of headaches when providing care to these patients. Only general data are provided for patients and their relatives without specific information regarding posttraumatic headaches. It can be stated that patients lack appropriate preparations before hospital discharge, and therefore, in order for mild traumatic brain injury patients to receive proper care and assistance, they need to receive systematic provision of necessary information regarding assessment, management, monitoring, and education of acute

posttraumatic headaches so as to reduce their suffering and improve the quality of nursing care. For these reasons, the investigator was interested in studying the management of acute posttraumatic headaches in mild traumatic brain injury patients. It was anticipated that the study findings would lead to development of a clinical nursing practice guideline and to improvement of the quality of nursing care as posttraumatic headaches can be found in as many as 30% to 90% of mild traumatic brain injury patients (Obermann, 2010; Seifert & Evan, 2010). In the management of posttraumatic headaches, it is important to manage symptoms and prevent chronic posttraumatic headaches (Obermann, 2010).

Most patients suffering from posttraumatic headaches recover within a few months, with a small but significant minority having persistent problems. Because of the many variables in prognostic studies, the percentage of patients with symptoms after mild traumatic brain injury varies greatly. The percentage of patients with headaches at one month varies from 31.3% to 90%, at three months from 47% to 78%, and at one year from 8.4% to 35%. More importantly, almost 25% of the patients have persistent headaches after four years (Seifert & Evans, 2010). In general, posttraumatic headaches contribute to disability, loss of productivity, high health care costs, and decreased quality of life among patients with traumatic brain injury (Erickson, Neely, & Theeler, 2011). Furthermore, posttraumatic headaches have adverse effects on families, work, and family relationships (Stevens, 2008) of the patients, while simultaneously greatly decreasing their quality of life (Aguggia, 2006; Chong, 2008). The current management of posttraumatic headaches suffers from lack of uniformly accepted diagnostic criteria, overlook, lack of interest in, not providing information to patients, lack of clinical trial research, lack of proven treatments, lack of guidelines, lack of coordinated care or “ownership” of the problem, and lack of acceptance regarding the legitimacy of the existence of chronic posttraumatic headaches (Erickson, Neely, & Theeler, 2011; Gladstone, 2009; Schwedt & Buzzi, 2011).

Therefore, with realization of the importance of an investigation of post traumatic headaches management in mild traumatic brain injury patients who are the most frequently encountered patients in the organization, it was anticipated that the findings of the present study would be used as baseline data to subsequently develop

clinical practice guidelines and shed light on nursing roles in the management of acute posttraumatic headaches in mild traumatic brain injury patients to ensure effective provision of care to ensure quality of life of the patients.

1.3 Purpose of the Study

The analysis and synthesis of research evidence to develop a clinical nursing practice guideline involving assessment, management, monitoring, and education of posttraumatic headaches in mild traumatic brain injury patients based on evidence-based practice.

1.4 Expected Benefits/Outcomes

1. The study findings would shed light on the knowledge regarding assessment, management, monitoring, and education of posttraumatic headaches in mild traumatic brain injury patients.

2. The study findings could be used as a guideline in providing nursing care to manage posttraumatic headaches in mild traumatic brain injury patients.

3. The study findings will also lead to development of an evidence-based clinical nursing practice guideline for management of posttraumatic headache in mild traumatic brain injury patients.

CHAPTER II
METHODOLOGY

This study was conducted with the objective of searching for evidence in order to acquire conclusions for developing an evidence-based practice guideline on posttraumatic headaches management in patients with mild traumatic brain injuries by setting the objectives, scope, and direction for the search for data in order to obtain proper recommendations on the assessment and management of headaches in patients with mild traumatic brain injuries. Steps of the search were as follows:

2.1 Search strategy

2.2 Appraisal method and levels of evidence

2.1 Search Strategy

The search for evidence was systematically conducted by gathering research studies, academic articles, and expert opinions so as to derive at evidence-based practice that matched patients with posttraumatic headaches. After that, the retrieved evidence was analyzed and evaluated to determine its level and credibility and to form conclusions on suggestions for the posttraumatic headache management in mild traumatic brain injury patients in the following steps:

2.1.1 The PICO framework

In this study, in order to acquire evidence concerning guidelines for posttraumatic headache management in patients with mild traumatic brain injuries, the scope for the search for studies and evidence was set using the PICO (Population, Intervention, Comparison, Outcome) framework of Craig and Smyth (2005) and Melnyk and Fineout-Overholt (2005) to set questions for obtaining studies and evidence-based practices that matched the study topic with details as follows:

P (Population): Mild head injury, mild traumatic brain injury, posttraumatic headache

I (Intervention): Cold packs, medication, physical therapy and manipulation, biofeedback, relaxation therapy, transcutaneous nerve stimulators, cognitive and behavioral therapies, thermal biofeedback, progressive muscle relaxation

C (Comparison): None

O (Outcome): Decreased pain, comfort, decreased headache, decrease posttraumatic headache

2.1.2 Scope of the Search

2.1.2.1 The scope of the search was determined as the inclusion criteria for selecting evidence that covered publications and disseminations in 2000-2013 in order to acquire only updated evidence published in either Thai or English with full texts available.

As regards the exclusion criteria, evidence with only abstracts, evidence-based practice conducted with pediatric patients, and evidence conducted with patients with headaches not caused by mild traumatic brain injuries were not selected.

2.1.2.2 The following keywords were used in the search:

- Mild head injury and posttraumatic headache
- Mild traumatic brain injury and posttraumatic headache
- Posttraumatic headache
- Posttraumatic headache and assessment
- Posttraumatic headache and management
- Posttraumatic headache and treatment
- Posttraumatic headache and evaluation
- Posttraumatic headache and intervention
- Posttraumatic headache and therapy
- Posttraumatic headache and cold packs
- Posttraumatic headache and medication
- Posttraumatic headache and physical therapy

- Posttraumatic headache and manipulation
- Posttraumatic headache and biofeedback
- Posttraumatic headache and relaxation therapy
- Posttraumatic headache and transcutaneous nerve stimulators
- Posttraumatic headache and cognitive and behavioral therapies
- Posttraumatic headache and thermal biofeedback
- Posttraumatic headache and progressive muscle relaxation
- Posttraumatic headache and decreased pain
- Posttraumatic headache and comfort
- Posttraumatic headache and decreased headache
- Posttraumatic headache and decreased posttraumatic headache

Settings for key words may change in each search in line with future search results. Boolean operators were used to help combine keywords by using the words “and” and “or” to help in the search.

2.1.2.3 The Following sources were determined for the search:Searches from electronic databases: single research studies were searched from the following electronic databases: Blackwell, BMJ, CINAHL, MDConsult, NursingConsult, OVID, ProQuest, Pubmed, ScienceDirect, SpringerLink. Also, SCOPUS Systematic Reviews were searched from www.joannabriggs.edu.au and The Cochrane Library Guideline from www.guidelines.gov.

- Online searches were also conducted from institutions or organizations that provided services of disseminating associated medical data from reference lists, i.e. www.ThaiLis.or.th.

- Manual searches were conducted to cover health academic journals, theses, and dissertations involved with headache management in patients with mild traumatic brain injuries from Mahidol University Library.

2.2 Appraisal Method and Levels of Evidence

2.2.1 Evaluation of Evidence Quality and Research Quality

Evaluation of the quality of the evidence obtained by the search employed the evidence-based practice assessment framework of DiCenso, Guyatt, and Ciliska (2005) by evaluating the following three issues:

1. Are the results valid?
2. What are the results?
3. How can I apply the results to patient care?

The three issues that were considered in the evaluation of the evidencewere as follows:

1) Are the results valid?

Randomized controlled trials are used increasingly to evaluate the quality, effectiveness, and cost of healthcare services. The power of randomization is that intervention and control groups are likely to be balanced with respect to both known and unknown determinants of outcome. The limitations of randomized controlled trials in health services research related to feasibility, external validity (generalizability), and their limited capacity to address the interaction of context, implementation, and impact of interventions. The strength of these observational designs lies in their potential to accommodate and assess the effects of contextual variation on processes and outcomes in a “natural” environment, thereby enhancing external validity. However, their weak point is their vulnerability to threats to internal validity. In a cohort study, the investigator identifies groups of patients, each a cohort, who are exposed and not exposed to the health services intervention and follows them forward in time to monitor the target outcome. In a case-control study, the starting point is the outcome of interest, such as an adverse event resulting from use or non-use of health services intervention. Those who experience the event are designated cases, and those who do not experience the event are designated controls. Investigators design case control studies to ensure that controls are reasonably similar to case with respect to important determinants of outcome such as age and sex, but who have not experienced the target outcome. Using this case-control design, the investigator then assesses the relative frequency of exposure to the intervention in the cases and

controls, adjusting for differences in known and measured determinants of outcome. As with cohort studies, case-control studies are susceptible to unmeasured confounding variables, particularly when exposure varies over time. Decision makers can draw inferences of only limited strength from the results of case-control studies because they only reveal whether an association exists and cannot determine whether such an association is causal. In systematic reviews, investigators explicitly state inclusion criteria for evidence, conduct a comprehensive search for the evidence, and summarize the results according to explicit rules that include examining how effects may vary in different subgroups. Systematic reviews provide strong evidence when the quality of primary study designs is high and sample sizes are large; they provide weaker evidence when study designs are poor and sample sizes are small. Because judgment is involved in many steps in a systematic review (including specifying inclusion and exclusion criteria, applying these criteria to potentially eligible studies, evaluating the methodological quality of the primary studies, and selection an approach to data analysis), systematic reviews are not immune to biases. Nevertheless, in their rigorous approach to identifying and summarizing data, systematic reviews reduce the likelihood of a bias in estimating causal links between health services intervention options and outcomes.

2) What are the results?

How large is the intervention effect? The same measures that are used to report effect sizes in studies of clinical interventions are also used in studies evaluating health services interventions (e.g., means, medians, odds ratios, relative risks, and absolute risk differences). An analysis of cluster randomized trials involves three approaches: (1) analysis at the cluster level, (2) adjustment of standard tests for the clustering effect, and (3) advanced statistical techniques using data recorded at both individual and cluster levels. How precise is the estimate of the intervention effect? The larger the sample size and the number of outcome events, the narrower the confidence interval. The boundaries of the confidence interval can help us interpret study results.

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

Were the study setting and context similar to mine ? Health services interventions have effects within, and are influenced by, contexts and the

local and regional health care system within which they operate. Seemingly similar programs can have different effects depending on the local clinical culture and factors such as management structures and level and quality of staff. The time of the research may also affect its relevance. Were all important processes and outcomes considered? Even when investigators report favorable effect of a health services intervention one or more important outcomes, readers should consider whether negative effects on other outcomes may not have been measured or reported. An outcome that is often neglected is the resource implications of alternative health services interventions. The increasing resource constraints facing health care systems mandate careful attention to economic evaluation, particularly of resource-intense intervention.

This part involved consideration of the feasibility of implementation by considering patients, situations and agencies. Implementation of the findings in the care of patients for systematic reviews must consider all significant outcomes and the benefits patients will receive more than expenses and risks with consideration of differences in minor groups, beliefs, values of patients and agency settings. Implementation of the findings in the care of patients by randomized controlled trials requires similarity among the sample groups in studies and interested patient groups while inclusion criteria must match patients in clinics. If the inclusion criteria fails to match the limitations or reasons preventing the intervention from feasible implementation with patients, but the characteristics of the agencies were the same as the research and the interventions can be implemented in agencies with consideration of expenses or dangers, the benefits patients will receive and policy or practice should be changed as a result of these findings. The findings of case-control studies and cohort studies in the care of patients were implemented by considering similarities between the sample group in the studies and interested groups of patients, considering whether or not the characteristics of agencies were the same as in the studies, comparing between risks and benefits to be received from exposure. The findings of this study were consistent with other evidence-based practice. Implementation of the findings in the care of patients of qualitative studies was carried out by considering whether or not the findings had meanings and consistency with practice. The findings prompted greater understanding of environments regarding practice, revealed the effects of the characteristics of participants on research findings

with similarities between agencies and studies. Furthermore, the findings enhanced knowledge and understanding about practice (Grace, 2009).

According to the evaluation of the three issues of validity and reliability, it has been documented that the evidence-based practice could be used to manage posttraumatic headaches in patients with mild traumatic brain injuries.

2.2.2 Evaluating Strength of Evidence

This study used the Therapy Evidence Pyramid of Grace (2009) which divided levels of evidence into the following seven levels:

Levels of reliability of evidence are concluded as shown in Table 2.1 below.

Table 2.1: Levels of Research Evidence

Level	**Sources of Research-based Evidence**
Level 1	Evidence derived from a number of one randomized clinical trials or a systematic review or meta-analysis of randomized clinical trials (RCTs)
Level 2	Evidence derived from a systematic review of randomized trials
Level 3	Evidence derived from a high quality single randomized trial
Level 4	Evidence derived from a systematic review of observational studies addressing patient-important outcomes
Level 5	Evidence derived from single observational study addressing patient-important outcomes
Level 6	Evidence derived from physiologic studies
Level **7**	Evidence derived from unsystematic clinical observations or expert opinions

Summary of M8ethodology

The use of the “PICO” (PICO framework) to determine the scope of the search led to evidence-based practice that matched the topic of management of headaches in patients with mild traumatic brain injury, which was a clinical problem of interest. The data obtained in the search were then analyzed and synthesized.

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.

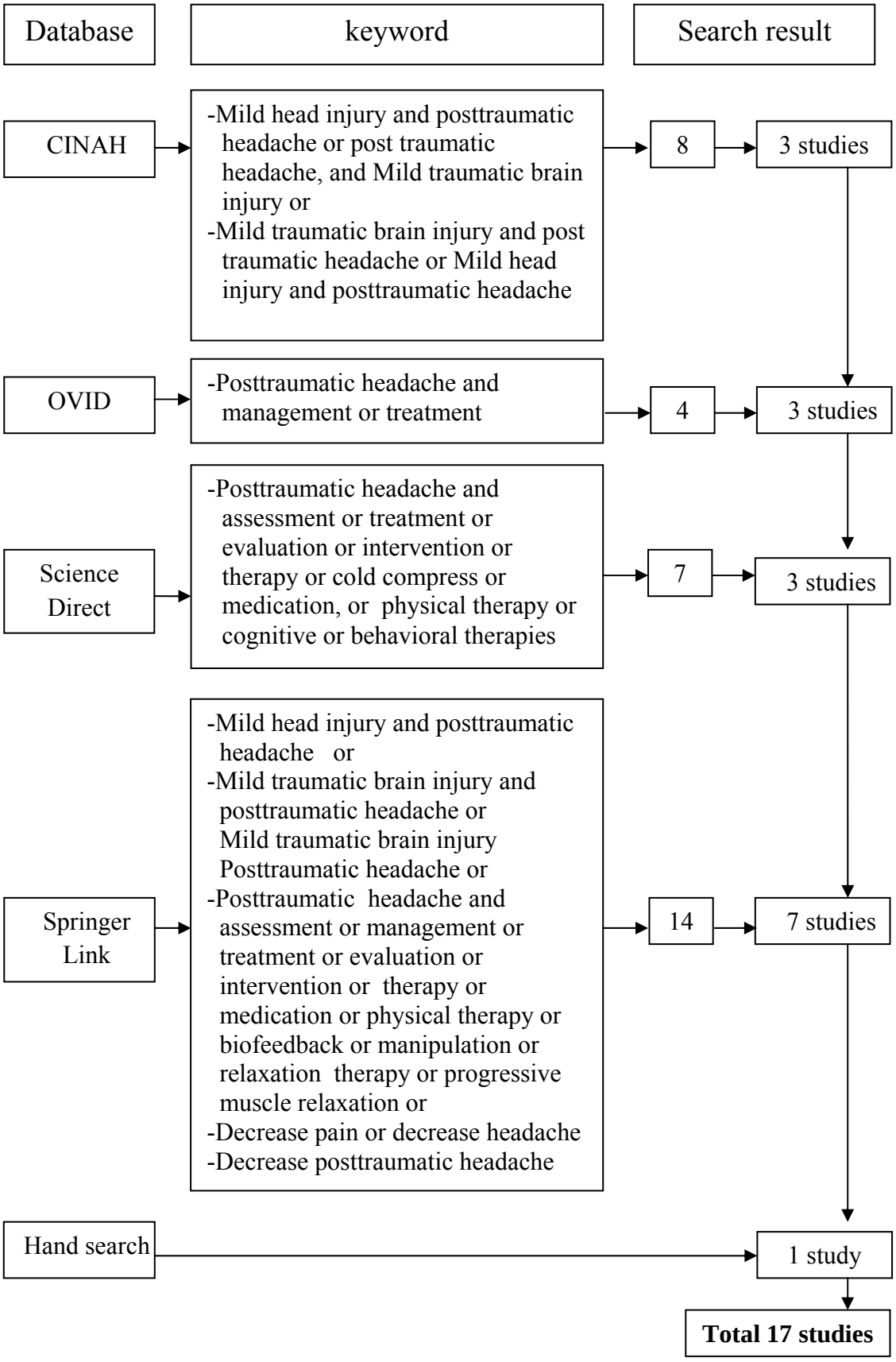

Figure 3.1: Findings of the Evidence-Based Inquiry

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.

CHAPTER IV
CONCLUSION AND SUGGESTIONS

Conclusion

This study is an analysis of all types of evidence related to posttraumatic headache management in mild traumatic brain injury patients. This study was conducted with the objective of recommending methods for posttraumatic headache management in mild traumatic brain injury patients by synthesizing knowledge according to the process of implementation of finding acquired from evidence. In study used the PICO (Population, Intervention, Comparison, Outcome) framework proposed by Melnyk and Fineout-Overholt (2005) to set questions for obtaining studies and evidence-based practice matching the studied topic. Evaluation of the quality of the evidence obtained by the search employed evidence-based practice assessment framework of DiCenso, Guyatt, and Ciliska (2005) by evaluating the following three issues: are the results valid, what are the results, how can I apply the results to patient care and evaluating strength of evidence used the therapy evidence pyramid of Grace (2009). Of the 17 evidences one evidence from systematic review of intervention studies (Level 4), one evidence from systematic review of observational studies (Level 4), one evidence from prospective controlled study (Level 5), one evidence from Cross-sectional correlational design(Level 6), and 13 articles from unsystematic clinical observations comprise evidence containing general studies with wide scopes from observations without systematic literature reviews, professional or expert opinions in specific professional groups in the care and treatment of patients in descriptive (Level 7). Can be applied to posttraumatic headache management in mild traumatic brain injury patients.

The methods for searching from electronic databases were as follows: searches for single evidence from Blackwell, BMJ, CINAHL, MDConsult, NursingConsult, OVID, ProQuest, Pubmed, ScienceDirect, SpringerLink while SCOPUS Systematic Reviews were searched from www.joannabriggs.edu.au., and

www.cochrance.org., searches for guideline from www.guidelines.gov. Online searches from institutions or organizations that provide services of disseminating associated medical data from reference lists, www.ThaiLis.or.th. Manual searches for complete originals of health academic journals, theses, and dissertations involved with headache management in patients with mild traumatic brain injuries from Mahidol University Library. The scope of the inclusion criteria for selecting evidence-based practice covered publication and dissemination in 2000-2013 in order to acquire only modern full-text Thai or English studies. The investigator selected 17 evidences relevant to the clinical issue and excluded 35 evidences because 35 evidences studying the effects of therapy and medications to treat abnormal headaches not specific to acute posttraumatic headaches.

According to the study, posttraumatic headache management in mild traumatic brain injury patient. These recommendation are management comprise four stages as follows: assessment, management, monitoring, and education.

Suggestions for Nursing Studies

1. The study findings can be used to developed a clinical nursing practice guideline for patients with mild traumatic brain injury in terms of nursing assessment, management, monitoring, and education.

2. The findings can also be utilized to enable nurses to coordinate with other healthcare team members to provide care to this particular group of patients.

Suggestions for Further Studies

1. An experimental study can be conducted to determine the effectiveness of the clinical nursing practice guideline developed based on the findings of the present study.

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