

## RISKS FACTORS OF CLIENT OUTCOME WITH HEAD INJURY

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### ABSTRACT

**Introduction:** head injury is one of the causes of mortality and morbidity. Several studies mention predictors over outcome. The objective of this systematic review is to explore and synthesis factors which contribute to client outcome with head injury. **Method:** source of articles used was obtained from the search through data base which includes Pro Quest, PubMed, and EbscoHost. This search is confined from 2006 to 2016. Subsequently, the journals were reviewed for systematic review. **Result:** there were 10 articles reviewed. Significant risk factors of head injury include socio demographic factors such as old age, male sex, low education level, clinical factor (GCS), injury due to road traffic accident, hypotension, hypoxia, increased intracranial pressure, absence of pupillary reaction, hypo and hyperglycemia, coagulopathy, hypo and hyperthermia, abnormal electrolyte level, episode of coma, result of intracranial lesion CT scan. **Conclusion:** outcome predictor in a patient with head injury will be useful in Triage criteria, prognosis of injury, care and discharge planning, the use resources and patient and family counseling

**Keyword:** risk factor, outcome, head injury

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### INTRODUCTION

Head injury is the most cases in the world. Data center for disease control and prevention (CDC) based on the emergency visit, hospitalization, and mortality resulting from 2001 to 2010 shows annual increase. There were 823,7 per 100.000 cases of head injury. Head injury is one of the most causes of mortality and morbidity. Several studies explain significant factors contributing to outcomes after head injury. Demographic parameter such as sex or clinical condition such as severity of injury, pupillary reflex, CT scan and laboratory results are taken into account as strong predictors of patient with head injury. These factors can be used to evaluate chances for client survival and can be the management guidelines (Xu et al, 2007 in Kim, 2011)

This can be basis for correct and immediate neurological criteria in emergency room. Moreover, prognosis can be used as counseling for clients and families in critical condition (Perel et al, 2006). By recognizing the factors affecting

client outcome with head injury, it can be used to develop management system and Triage for clients with head injury so that it can be reduce mortality and morbidity resulting from head injury. Therefore, the objective of this systematic review is to evaluate articles for subsequently drawing conclusion of factors that can be used to predict client outcome based on evidence based practice.

### METHODS

Methodology used in this systematic review as preceded by topic selection, then keyword was determined to search journals in English though some data base which includes PubMed and Pro Quest, EbscoHost, Scopus. This search was confined from 2006 to 2016. the key words were traumatic brain injury, OR head trauma OR head injury and predictor OR factor OR prognosis. Articles selected for review ware based on studies conforming inclusion criteria. Inclusion criteria in this systematic review were primary research articles in English. The subjects were

humans without age limitation, sex, and ethnicity with severe head injury. Outcome prediction was good during hospitalization or one year after head injury. Outcome prediction at least consisted of two variables. Exclusion criteria were case report, article review, and multiple injury. Glasgow coma scale (GCS) consists of three components: 1) eye response, 2) verbal response, and 3) motoric response. Total GCS is one of the considerations for predictor in this review.

The search by using the keyword above found ten articles that meet the inclusion criteria. Then the sixteen articles were reviewed, synthesized, and presented in a table.

## RESULTS

Upon screening, 10 journals meeting inclusion and exclusion criteria were obtained. Most of the studies were conducted in Europe and USA. Glasgow Outcome Scale (GOS) measured within six months or one year after head injury was found the most. Some variables are discussed in the research articles. Significant predictor of the multivariate analysis result is explained in synthesis articles. Table 1.1 shows summary predictor upon outcome of head injury after discharge. The elderly, severe injury, absence of pupillary reaction, hypotension or hypertension, increased intracranial pressure, hypoxia, hyperglycemia or hypoglycemia, hypothermia or hyperthermia, low hemoglobin, coagulopathy, high lactate level, CT scan of subarachnoid, epidural, or subdural bleeding were identified as factors affecting bad outcome (GOS) in the three studies.

## DISCUSSION

This systematic review discussed some studies examining factors contributing to client outcome with head injury. Factors affecting bad outcome (Glasgow coma scale) which includes the elderly, severe injury, absence of pupillary reflex, blood pressure, hypothermia or

hyperthermia, low hemoglobin, coagulopathy, high lactate level, electrolyte imbalance, subarachnoid, epidural, or subdural bleeding.

Few number of clients aging 65 years old manage to survive after head injury (Calvin, 2012). Therefore, it can be synthesized that all elderly clients with mild injury should undergo Triage in emergency room for rapid and serial assessment.

In general, severity of injury is one of the important factor of client outcome post injury. GCS is a tool commonly used in many studies. Some studies examine components of GCS such as motoric or verbal response particularly with lesion. For initial assessment, GCS may be slightly neglected and sedative medication can affect results of GCS measurement particularly for patient with narrow gap between moderate and mild head injury. Therefore, GCS must be done in serial fashion although the client has been stable and is evaluated with CT scan.

Although GCS has limitation associated with a number of symptoms (Udekwu et al.2004, Davis et al.2005), it is still recommended to be used as a method in evaluating level of consciousness in a client with head injury (Luk et al 1999, Udekwu et al.2004). insufficient oxygen supply to the brain can directly contribute to unexpected incident; for example, decreased blood flow to the brain causes a number of pathophysiologic event post head injury, including increased intracranial pressure, brain vasospasm or systematic hypotension. Several studies found significant association between systematic secondary symptoms (hypoxia, hypotension, and hypothermia) post head injury and bad client outcome (Van Beek et al. 2007, Fabbri et al. 2008). Therefore, it is important to stay alert in initial assessment although outcome has been monitored (McHugh et al. 2007).

Mechanism of head injury is one factor associated with client outcome (Tien et al, 2006). Mechanism of injury affects consciousness before and after surgery.

Passengers who suffer from head injury due to road traffic accident with high speed vehicle do not develop lucid interval and is in prolonged comatose after surgery than traumatic clients with low speed vehicle. This injury indicated as diffused head injury.

Abnormal parameter of laboratory study during admission is an important outcome predictor post head injury. Laboratory parameter is considered objective, regularly measured, and very important. Abnormal value can be corrected with treatment to cover non-modifiable parameter such as age, and radiology results (Van Beek et al. 2007). Although hyperglycemia or hypoglycemia, coagulopathy, anemia, acidosis, or hyperthermia are important markers of severity, it is important to focus on incidence and abnormal correction parameter. Studies evaluate further benefit, and initial parameter correction is suggested in randomizes clinical trial.

Classification of CT Marshal is a strong prognosis tool to determine client outcome with head injury. Classification of CT Marshal uses CT scan finding at mesencephalic level, middle line movement, and the presence or absence of localized lesion to categorize patients into six different groups (Matoha. 2016). Most studies show that clients with type I diffused head injury have better outcome while group IV or V clients with lesion found in CT have worse outcome. There is strong association between classification of CT Marshal with outcome. Later, studies focus on combination of CT characteristic and other predictors to increase prognosis value.

Intracranial lesion is associated with prognosis of intracranial bleeding. Subarachnoid hemorrhage (SAH) having five fold risks to increase shows worse outcome (Fabbi et al. 2008) and is a clear characteristic in outcome prediction (Maas at al. 2007). This study explains additional SAH prognosis value through CT scan results as a predictor for brain damage.

Knowing abnormality through surgical procedure in SAH or SDH cases is important for management of acute brain injury. In addition, study of clinical history and CT scan scoring is recommended for evaluation and improving prognosis for head injury.

The scope of this study covers studies with two predictors. Therefore, it is likely that there will be some misses in the articles related to the use of multivariate to analyze individual predictor, and estimation is not reported in the abstract. In some articles reviewing GOS over outcome. Some articles predict GOS for six months and the other seven articles predict GOS for twelve months. This review does not divide predictors into two groups of articles because it may cause bias leading to study of outcome that is only based on the six months.

GOS take stable condition into account in six months post injury (Hukkelhoven et al. 2006), so this limitation is considered insignificant. This review does not analyze bias even though bias can affect accuracy of prediction of a study. Also, this review does not compare predictor based on countries that may be important in exploring accuracy of prediction model in different location for further studies.

## **CONCLUSION AND RECOMMENDATION**

### **Conclusion**

This systematic review discusses factors contributing to outcome of patients with head injury. Significant factors associated with outcome include socio demography such as age, male sex, level of education; clinical factors such as GCS score, injury due to road traffic accident, hypotension, hypoxia, increased intracranial pressure, absence of pupillary reaction, hypo or hyperglycemia, anemia, coagulopathy, hypo or hyperthermia, abnormal electrolyte level, episode of comatose; high classification of CT

marshal, intra cerebral lesion such as hemorrhage or subdural hematoma.

### Recommendation

This systematic review implicates nursing practice. Based on the reviewed studies. It shows that outcome predictor in a patient with head injury will be useful in Triage criteria, prognosis of injury, care and discharge planning, the use resources and patient and family counseling. This study will be useful as objective guidelines for health care professionals to evaluate criteria and traumatic patients to fulfill criteria of physiologic standard.

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