The Nurses' Role in Handling Increased Intracranial Pressure for Hemodinamic Stats in Head Injury Patients

Sutiyo Dani Saputro[1], Siswanto[2], Yulian Wiji Utami[2]

[1]Students of Nursing Master Study Program, Faculty of Medicine, Universitas Brawijaya,
[2]Lecturer of Nursing Study Program, Faculty of Medicine, Universitas Brawijaya

Abstract

Background: Head injury is a major matter of death and disability at a young or productive age. The prevalence of head injuries has occurred and increased. The incidence of head injuries in the world was reported 29,770 cases. A head injury produces intracranial haemorrhage, following the increased intracranial pressure. The increased intracranial pressure changes the hemodynamic status in the body. The treatment of increased intracranial pressure needs to be conducted immediately to avoid a bigger impact.

Purpose: This review is to determine the handling management of intracranial pressure elevation for hemodynamic status in head injury patients.

Method: The article adopted a systematic review. The identification of literature was performed by searching journal articles that have been published in 2009-2019 within databases such as Proquest, EBSCO, Science Direct, and Pubmed. The search was using keywords : nurse handling, intracranial pressure, hemodynamic status and, head injury. The selected articles that were decided by a combination of PRISMA flow diagrams with the Joana Brigg Institution (JBI) checklist obtained 16 corresponding articles.

Result and Discussion: The management of intracranial pressure such as positioning, hypothermia management, and ventilation control as well as medical actions such as adequate oxygenation, drainage action, diuretic and hyperosmolar therapy, blood sugar control, and decompressive craniectomy.

Conclusion: Management of increased intracranial pressure for hemodinamyc status in head injury patients consists of positioning, oxygenation, hyperventilation, drainage, diuretic therapy, hypothermia management, blood sugar control, decompressive craniectomy.

Keywords: *Nursing treatment, Intracranial Pressure, Hemodynamic status, Head Injury.*

Introduction

Head injury is the global health problem that causes death, disability an mentality deficits. The head injury become the first death reson and disability in the young age or productive age[1]. Head injury is able to make edema cerebri or the intracranial bleeding by increasing the intracranial pressure[2].

Head injury prevalence is often happen and increase day by day, The number of head injury shows 29.770 cases, the majority victims because of the traffic accidents and it dominate in 51 years old [3]. Head injury in Indonesia also increase from 2,7 percent in 2007 become 8,2 percent in 2013, The head injury caused of bump (40,9%) The head injury because of Motorcycle incident is(40,6%). The head injury in the East Java shows the improvement from 9,3 percent in 2013 to 11,1 percent in 2018[4].

The head injury cause the intracranial bleeding so it will disturb the regulator function in the body and influent the hemodynamic to the head injury patient[5]. The Intracranial is influent the increasing of blood pressure, The improvement as the impact of blood pressure because of the pressure in the vein to the brain[6].

The improvement of blood pressure is able to improve the pulse frequency in the body. The brain bleeding also influent the lung function and other part

of body so the breath sytem and the temperature of body become regular [1]. Intracranial bleeding cause the intracranial pressure. The improvement is cause the awareness stage by using Glasgow Coma Scale [7].

Head injury patient with the decrease of awareness level will suffer the hemodynamic disruption status as the increasing level of blood pressure, decreasing frequency of breathing and pulse [8].. The increasing of intracranial pressure will disturb the flowing of blood to the brain so the brain will ischemic. The monitoring of hemodynamic status becomes the indicator of about prognosis patient. The head injury with intracranial monitoring is able to prevent perfusion flowing the blood to the brain. Hemodynamic status and intracranial status is really influence to the oxygen transfer to the brain [6]. This systematic review is to knowing the role of nurse in the treatment of handling the intracranial pressure for improved hemodinamyc status in head injury patient.

Method

1. **The Identification and Article selection:** The method that is done is the systematic review that is three stages there are determining the question by the PICO method, earning the data to the literature review that is include: identification, screening, appropriateness selection and the criteria of inclusion and literature synthesize to get the systematic review.

In this systematic review use several questions with the Emergency nurse IGD (population/patient), the intervention about the nurse role in the emergency room in increasing the intracranial pressure (outcome).

The earning data step to the literature review include the identification of the journal in the systematic review is by finding some journal that has been published in 2009-2019 in the international journal that is provide in several data base such as, ebsco, science direct dan pubmed. The finding is doing by typing the keyword: “role”, “nurse”, “handling”, “hemodynamic status”, “intracranial pressure” and “head injury”. Then the fifth words ins merged so it will appear keyword: In this article findings, it is found 23 articles in proquest, articles in Ebsco, 24 articles in Science Direct and 4 article in Pubmed. The screening that is done in the title and abstract it gained 32 articles that is suitable to the head injury treatment. The selection is continue by choosing the relevant journal with the management of increasing intracranial pressure (eligible) and has the similarity with the design study. In the last stage it only gained 16 relevant article with the improvement of intracranial pressure.

2. **Celection Criteria:**

The choose references to the synthesis must full fill the inclusion, there are:

a. Type of study: randomised controlled trials, quasy experiment, systematic review and case series.

b. The participants type: The head injury patient and the medical staff that give the increase of intracranial treatment

c. Intervention type: head injury management is begin from monitoring, intervention making, implementation and the evaluation from the treatment of both intracranial pressure and the head injury

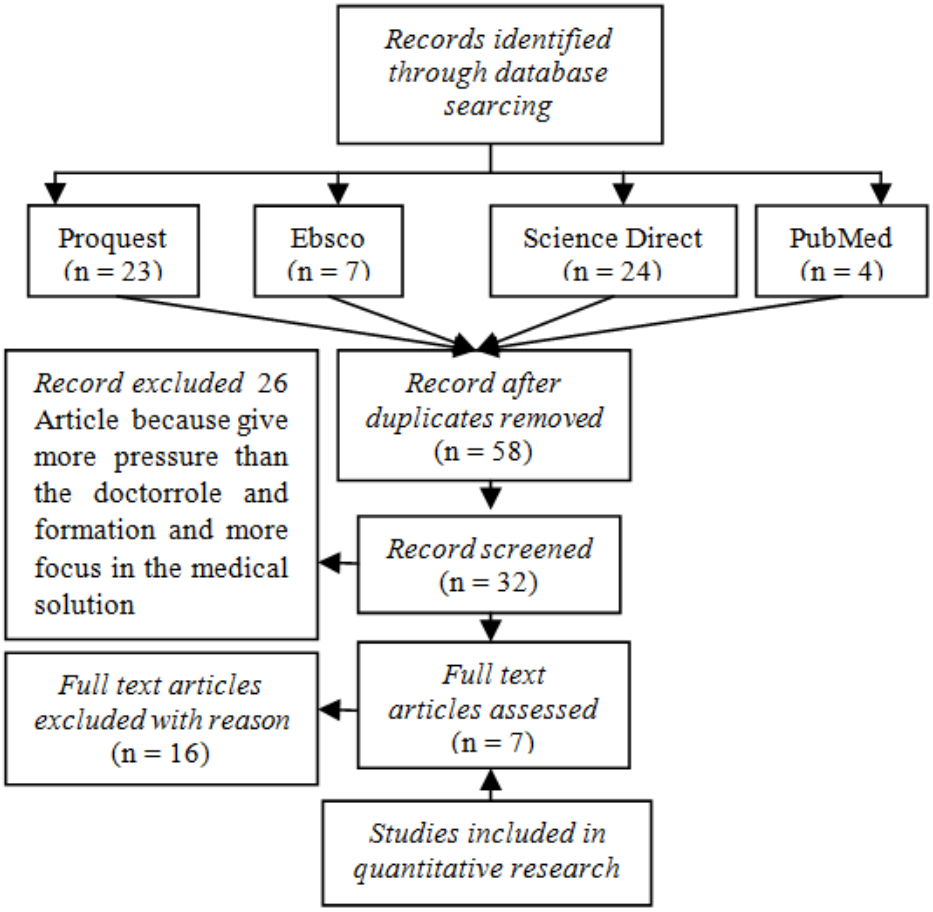
d. Type of the result: The result is seen from the intracranial and the hemorrhagic status of the patient that include the blood pressure, breathing frequency, pulse, temperature, oxygen saturation and the awareness level.

Exclusion frequency in the article can be gotten include:

a. Editorial study type and the comment result

b. Treatment setting in the pre hospital

The selection and the choosing of document use PRISMA stage that can be seen in picture 1.



Picture 1. The PRISMA stage diagram to identify the literature

Result and Discussion

The result from 16 articles that has been synthesize is gained the nurse role in the handling of the increasing of intracranial pressure include: the adequate oxygen giving, control, hyperventilation, drainage treatment, diuretic treatment and hyperosmolar, hipotermia manegement, The control of blood sugardecompressive craniectomy, positioning.

The objective of patient treatment with the intracranial pressure increasing there are decrease of TIK in the range of 10-15 mmHg, optimize CPP is higher than 60 mmHg, keeping the adequate oxygen, and prevent the brain herniation. Most of the management technique in oriented to the volume control cerebral blood volume and the CSS circulation.[18]

The giving of Adequate Oxygen: Giving the adequate oxygen can be started by keeping the breathing ways. The breathing ways can not be balance and inadequate ventilation can cause the hypoxemia and hypercarbia that cause the blood serebral and worsen TIK[18]. The hypoxia condition cause the vasodilatation of the brain nerve so it will worsen the intracranial bleeding condition. The giving of adequate oxygen can decrease the intracranial so it prevent the increase intracranial[11].

Hyperventilation Control: Amri (2017) stated that intracranial management pressure can be done in head elevation and hyperventilation. Hyperventilation can decrease the PaCO2 that has been caused the vasokontrikasi of the cerebral artery and the cerebral blood flew. Hyperventilation is used to decrease TIK to the short term time when the worsen the acute neurology as herniasi and other method to decrease TIK[20].

Drainage Treathment: The improvement of intracranial pressure tp the head injury patient that is drainage and diuretic and hyperosmolar[17]. Drainage treatment is done if the hyperventilation is unsuccessful. The short term time is drainage ventricular, while the

long term time is covered by ventricular peritoneal shunt, such as hydrocephalus[18]. Nurse must to make sure the drainage hose is savety in the position[15].

Deuretik dan hyperosmolarTherapy: Zeng et al[14] stated that the electrolyte control is using hypertonic saline 10% better than mannitol 20% in the preventing of ischemic in the brain cell. Enming et al [16] stated that the giving of thrombosis lateen is able to decrease the brain edema and decrease the intracranial pressure. The side effect from osmotic diuretic including hypotension and electrolyte disruption. If the used of mannitol the patient must to having the volume of adequate intravascular to prevent the hypertension and the secondary head injury[21].

Hipotermia management: Dash & Chavali[11] stated that the intracranial pressure management can be held such asliquid management, osmotherapy, temperature managemet and glychemic control. Head injury will be affected in the blood circulation to the brain that is caused hypoxemia. Nurse must to make sure that the hypotermia management is safety to the patient. It also needs to control of the temperature and TIK improvement to the patient[22].

Blood Sugar and Nutrition Control: Dash & Chavali [11] stated that intracranial pressure management can be held by using the glycemic control. Head Injury is caused the brain trauma that is cause to the increasing of catecholamine. The increasing of catecholamine is signed by the cortical release and glucose intolerant that cause hyperglycemia. Nurse also needs to keep the slang regularly to monitor the residual, the clean slang, and the giving of medicine. It needs to be attention that the aspiration and reflux from the patient [23]

Decompressive craniectomy: Gopalakrishan et al [12] stated that the decompressive craniectomyprevent the brain herniation and the decrease the intracranial. Craniectomy is to decrease the intracranial by giving the adding space in the brain and prevent the brain stem herniation because of the brain swollen. Fung et al [13] stated that the postdecompressive craniectomyin the 21st day is able to increase the per hematoma edema from 42,9 ml – 125,5 ml.

Positioning: Larson, Delnat & Moore [9] stated that the using of cervical cooler is able to minimize the head injury to prevent the brain stem edema because the increasing of head injury and cervical. List et al [10] also stated that the head injury management can be handle the worsen of fracture cervical 5-6 % so the control of hyperventilation need to keep stabilization of neck and head position. If the neck flections, extension or rotation will limit the vena drainage from head to jugulars vena and vetebralise so it will increase the whole of intracranial content [24].

Conclusion

The result of this systematic review from 30 articles that has been synthesize by the writes is gained the nurse role in the handling of the increasing intracranial pressure to improved hemodinamyc status in head injury patient that is: the adequate oxygenation, hyperventilation control, drainage handling, diuretic therapy and hyperosmolar, hypothermia management, blood sugar control, Decompressive craniectomy, Positioning.

Ethical Clearance: This article has been approved by the Medical Faculty of Brawijaya University

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