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Effectiveness of a 30° Head-Up Position for Lowering Headache Severity in Mild Head Injury

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Abstract: This single case study evaluated the effect of a 30° head-up position on headache and vital signs in a 16-year-old male with mild head injury presenting to the Emergency Department of RSUD Kanjuruhan, Kepanjen (21 June 2025). The non-pharmacological intervention head elevation at ~30° for ~30 minutes per session over one 8-hour shift was monitored pre- and post-session for blood pressure, heart rate, respiratory rate, temperature, oxygen saturation, and pain (Numeric Rating Scale). Serial improvements were observed: blood pressure decreased from 149/90 to 111/84 mmHg, heart rate from 113 to 89 beats/min, SpO_2 increased from 95% to 99%, temperature rose from 35.9 to 36.6 °C, respiratory rate remained stable (20→19/min), and pain declined stepwise (NRS 6→5→4) with subsequent patient report of no headache. Intracranial pressure and cerebral perfusion pressure were not directly measured; inferences about cerebral physiology are therefore indirect and based on hemodynamic and symptomatic trends. Within the constraints of a single-subject design, the 30° head-up position appeared feasible, safe, and clinically useful for symptom relief and physiologic stabilization in hemodynamically stable mild head injury, while warranting caution in patients at risk of reduced MAP/CPP or with cervical contraindications. Larger comparative studies are needed to confirm these effects.

Keywords: Mild Head Injury, TBI, Head Elevation, ICP, CBB, Oxygen Saturation.

INTRODUCTION

Head injury or Traumatic Brain Injury (TBI) is a condition in which normal brain function is impaired due to a blow, jolt, impact, or penetrating trauma to the head (Ismy, 2020). Over the past decade, its incidence has tended to rise in parallel with the growth of motor vehicle use and rapid urbanization, particularly in countries undergoing transition and development. The World Health Organization (WHO) has projected that by 2024, injuries from road traffic crashes would rank among the world's major health problems and constitute the third-largest cause of disease burden globally (Zahara, 2024).

The burden of TBI is substantial, as it is a leading cause of trauma-related death and disability in many developing countries. Epidemiologically, adolescents especially those aged 15–19 years are most frequently affected, and males carry roughly twice the risk of

females. This pattern is closely related to greater exposure among males to motorcycle riding and, consequently, to road traffic crashes (Nobrihas et al., 2023).

The clinical consequences of TBI extend beyond acute mortality to short- and long-term morbidity. Patients may experience physical limitations, decreased activity in older age, and a range of post-traumatic symptoms such as sleep disturbances, anxiety, depression, and post-traumatic stress that diminish quality of life (Monica et al., 2024). At the health-system level, the economic burden is considerable, with annual management costs estimated to be substantial (Amni et al., 2024).

Pathophysiologically, TBI can involve multiple structures, from the scalp and skull to brain tissue and other intracranial organs. The most common etiologies include sudden blows or impacts to the head occurring in road traffic crashes, falls, or assault (Yueniwati & Aurora, 2022). Injury severity is typically classified as mild, moderate, or severe; initial assessment considers the site of impact, head condition at the time of injury, and level of consciousness—commonly measured using the Glasgow Coma Scale (GCS) (Ns Elida Sinuraya, S. Kep, 2020).

Road traffic crashes are consistently identified as the predominant cause of unintentional head injury and a major contributor to trauma mortality (Putri et al., 2024). Beyond mortality, they generate wide-ranging social and economic burdens from lost productivity to rehabilitation costs. Yet this issue often remains under-recognized in public health agendas of low- and middle-income countries undergoing rapid urbanization and experiencing a surge in motorized vehicles (Naibaho et al., 2025).

Globally, TBI prevalence remains high at approximately 811–979 cases per 100,000 population per year, with an estimated 475–643 per 100,000 presenting to hospitals annually. Overall, there are about 50–60 million new TBI cases worldwide each year, and TBI accounts for 30–40% of all trauma-related deaths (Purqoti et al., 2023). In Indonesia, the 2018 Basic Health Research (Riskesdas) reported a head-injury prevalence of 11.9%, the third highest after lower- and upper-extremity injuries. WHO's *Global Status Report on Road Safety 2018* likewise documented roughly 1.3 million deaths annually from road traffic crashes, with 20–50 million people sustaining non-fatal injuries. In Central Java, most cases are mild head injuries (≈80%), while moderate and severe injuries account for about 20% (Hulwah et al., 2021).

The high proportion of mild head injury has important implications for emergency services, as persistent symptoms especially headache affect comfort, functional outcomes,

and resource needs. At the front line of care, simple, low-cost, and easily implemented non-pharmacological interventions become highly relevant for improving patient comfort while supporting neurological stability. A commonly used approach in clinical practice is the 30° head-up position, intended as supportive care to enhance comfort and control symptoms such as headache in mild head injury.

Given the substantial disease burden, the predominance of mild head injury in emergency settings, and the need for practical and safe interventions, evaluating the effectiveness of a 30° head-up position for reducing headache in patients with mild head injury is warranted. Generating local empirical evidence particularly in the Emergency Department of RSUD Kanjuruhan, Kepanjen can strengthen clinical decision-making and service policies while potentially improving nursing care quality and patient comfort in the acute phase.

RESEARCH METHOD

Study Site and Period

This single-case study was conducted at the Emergency Department of RSUD Kanjuruhan, Kepanjen, Malang Regency, East Java, Indonesia, on 7 June 2025.

Clinical Setting and Care Process

The managed patient was a 16-year-old with a nursing problem of mild head injury (MHI). Prior to establishing the nursing diagnosis, the researcher collected subjective and objective data. Subjective data were obtained through interviews with the patient and family; objective data were gathered through direct clinical observation. After data collection and validation, the researcher followed the nursing process assessment, diagnosis, planning, implementation, and evaluation to deliver and appraise care for the patient with MHI.

Study Subject and Case Selection

This Final Professional Nurse Scientific Case (Karya Ilmiah Akhir Ners, KIAN) used a case-study approach involving a single subject, referred to by the pseudonym **F**. The participant was 16 years old and resided in Kepanjen, Malang, East Java. A purposive case-selection strategy was used, grounded in the theoretical consideration that inadequately managed mild head injury carries a risk of increased intracranial pressure (ICP), which can

precipitate decreased consciousness, additional neurological symptoms, complications, and even death.

Data Collection

Three complementary methods were used:

a) **Interviews.** Structured and semi-structured interviews were conducted with the patient (and family, as needed) to obtain subjective data regarding current health status, past medical history, chief complaints, the patient's perceptions of illness, and experiences during care.

b) **Observation.** Continuous bedside observation was performed to document objective findings and patient responses during assessment and throughout nursing interventions. Vital signs and clinical parameters relevant to the study (blood pressure, heart rate, respiratory rate, temperature, SpO_2, pain scale, and level of consciousness/GCS) were recorded before and after the 30° head-up positioning.

c) **Documentation.** Nursing documentation including assessment notes, nursing diagnoses, care plans, intervention records, and evaluation/progress notes—was reviewed and compiled to support and triangulate interview and observation data.

Editorial consistency: the original draft briefly mentioned "hypertension" in the documentation line; this has been standardized to mild head injury to align with the study focus.

Data Analysis

Data from interviews, observations, and documentation were analyzed descriptively within the nursing-process framework. Findings are reported as a within-case (single-subject) pre-to-post description comparing clinical parameters and pain scores before and after the 30° head-up intervention. No inferential statistics were applied given the single-case design.

Research Ethics

Ethical principles were upheld throughout:

1. Informed consent. Participation was voluntary without coercion or intimidation. Because the participant was 16 years old, written informed consent was obtained from the legal guardian, with patient assent, according to hospital policy.

2. Right to privacy. Personal data were protected to prevent misuse.
3. Anonymity. The participant's identity was concealed using the pseudonym F.
4. Confidentiality. All information was accessible only to the researcher and used solely for research purposes, following institutional confidentiality standards.

RESULT

On 21 June 2025 at 11:50 WIB, an assessment was conducted on Mr. F, a 16-year-old male. He is Muslim and a senior high-school student; in daily life he is a student. According to his address, he resides in Kepanjen District, Malang Regency. During his hospital visit on 21 June 2025, the assessment indicated that the patient had a mild head injury and had not taken any medication. His daily activities are largely independent. Blood-pressure vital signs were measured before (pre) and after (post) the intervention during the encounter. The patient's level of consciousness was compos mentis with a fair general condition. The examination of oxygen saturation and blood pressure showed a gradual improvement; upon arrival at the ED after the traffic accident, the pre-intervention blood pressure was 149/90 mmHg and the post-intervention blood pressure was 111/84 mmHg.

Regarding current health history, Mr. F reported no specific illnesses, but he complained of dizziness and headache, and a lump was present on the upper right side of the head. For past medical history, the patient reported none. As for family history, the patient stated that a family member his mother has a history of hypertension. While at home, Mr. F maintains a fairly regular daily routine. In terms of diet, he eats 2–3 times per day, with food such as white rice; side dishes like tofu, tempeh, and fish; and vegetables such as clear soup, soup, and *sayur asem* consumed as desired. For fluids, he drinks about 1,600 mL of water per day, sometimes more, and occasionally makes tea. There are no difficulties with eating or drinking, and no special efforts are needed because there are no complaints. For elimination, Mr. F reported no problems with urination or defecation. He urinates 2–5 times per day with urine that does not have a strong odor. Bowel movements occur 2–3 times per day, with stool consistency ranging from formed to soft, and without pain. For rest, he sleeps 6–7 hours per night with no sleep disturbance. For personal hygiene, he bathes 1–2 times per day, washes his hair at each bath, and brushes his teeth twice daily, at noon and at night. He also stated that he always trims his nails routinely when they appear long, and all self-care activities are performed independently without

assistance. For other activities, Mr. F stated that after returning from school he does not do much because he feels tired, so his physical activity is limited.

A subsequent physical examination was carried out on 21 June 2025. In general, Mr. F appeared somewhat disheveled; there was dried blood behind the ear; a lump was present on the right side of the head; he grimaced, yet remained fully conscious (compos mentis) and able to respond well throughout the assessment process. On vital-signs examination, pre-illness data could not be obtained. However, at the time of assessment the results were: blood pressure 149/90 mmHg, pulse 113/min, respiratory rate (RR) 20/min, temperature 35.9 °C, MAP (109), BAP (and oxygen saturation (SpO_2) 94%).

Data Analysis and Nursing Diagnosis

Based on the assessment of Mr. F, the priority problem determined using **SDKI** (Indonesian Nursing Diagnosis Standards) is as follows: **Acute pain**, evidenced by a scalp lump (hematoma); subjective data: the patient reports pain in the upper right side of the head.

Implementation

According to the nursing care plan formulated using **SIKI** (Indonesian Nursing Interventions Standards), implementation on **21 June 2025** was as follows:

1. For **Acute Pain** related to Mild Head Injury, the 30-degree head-up positioning therapy was applied, vital signs were monitored, and the patient's and family's ability to receive information was identified. The intervention focused on providing a 30° head-up position to reduce the patient's pain, with the following steps:
2. Apply safety measures to the patient's bed.
3. Check the patient's baseline vital signs.
4. Instruct that the 30° head-up position can be maintained for 30 minutes; Mr. F was able to maintain the position for approximately 30 minutes.
5. Position Mr. F with the head elevated about 30 degrees from the bed, the trunk aligned, and the legs extended without flexion.
6. Ensure the head remains aligned with the body neither flexed nor bent throughout the ~30 minutes.
7. Reassess the patient's vital signs after the intervention.

8. Repeat the **head-up** positioning as needed according to the patient's clinical condition.

Nursing Evaluation

After one 8-hour shift of care on 21 June 2025, the nursing problem of Acute Pain associated with mild head injury was evaluated. Subjective**:** Mr. F stated he no longer complained of headache and agreed to continue the 30° head-up position to reduce head pain. Objective**:** the patient's grimacing decreased; the problem was partially resolved.

Results of the 30° Head-Up Intervention

Pain-scale measurements were conducted in the Emergency Department following the road-traffic incident. Before the 30° head-up intervention, pre measurements of blood pressure, heart rate, temperature, respiratory rate (RR), SpO_2, and pain scale were taken; after the intervention for mild head injury, post measurements of the same parameters were recorded using the Numeric Rating Scale (NRS) for pain. Each 30° head-up session lasted approximately 30 minutes, and the findings are presented in the following Table 1.

Table 1. Effect of 30° head-up positioning on BP, HR, RR, SpO_2, temperature, and pain in mild head injury over one shift.

Time	Phase	BP (mmHg)	HR (bpm)	Temp (°C)	RR (/min)	SpO_2 (%)	Pain (NRS)
11:50	Pre	149/90	113	35.9	20	95	6
~12:20	Post	130/87	105	36.5	19	97	—
12:30	Pre	130/87	105	36.5	19	97	5
~13:00	Post	123/85	100	36.6	19	99	—
13:30	Pre	123/85	100	36.6	19	98	4
~14:00	Post	111/84	89	36.6	19	99	—

Based on Table 1, which presents the vital signs measured before and after the intervention in Mr. F over one 8-hour shift, the following results were obtained: pre-intervention blood pressure 149/90 mmHg, heart rate 113 beats/min, temperature 35.9 °C, respiratory rate 20/min, and SpO_2 95%; post-intervention these improved to 111/84 mmHg, 98 beats/min, 36.5 °C, 19/min, and 98%, respectively. Overall, the serial observations after the intervention show a downward trend, indicating a positive effect of the intervention on reducing cerebral perfusion pressure and pain in Mr. F.

Discussion

A 30° head-up position is a practical nursing intervention that has been shown to reduce intracranial pressure (ICP) while preserving if not improving cerebral perfusion

pressure (CPP) in clinically stable patients with head injury. Elevating the head facilitates cerebral venous outflow, thereby decreasing intracranial blood volume and helping to prevent intracranial hypertension that could otherwise aggravate neurologic injury.

In this case, effectiveness was examined comparatively by tracking blood pressure, heart rate, respiratory rate, oxygen saturation, and pain before and after each 30-minute head-up session across an eight-hour shift. We observed a progressive normalization of cardiovascular parameters (declines in BP and HR), stable respiration**,** improved SpO_2**,** and a stepwise reduction in headache intensity (Numeric Rating Scale 6 → 5 → 4, later resolved). These bedside trends are consistent with prior reports that 30° head elevation can improve oxygenation in patients with head injury (Yunus et al., 2024).

Traumatic brain injury (TBI) typically arises from sudden blows or impacts to the head (e.g., vehicle crashes, falls, assault) and can produce permanent brain damage, including ischemia, with both cranial and systemic complications. Core management principles include vital-sign monitoring, ensuring adequate oxygenation, addressing coagulopathy, maintaining hemostasis and euglycemia, and providing appropriate nutritional support.

Evidence suggests that a 30° head-up position is an effective, non-invasive measure to lower ICP without materially reducing CPP (Syaharuddin et al., 2025). By enhancing venous return, head elevation may also reduce the risk of cerebral edema (Sattur et al., 2023, reporting an average ICP reduction of ~5 mmHg). Advantages include simplicity, safety, immediate applicability, and no requirement for specialized equipment. Caveats remain: in hemodynamically unstable patients, head-up positioning can lower mean arterial pressure (MAP) and thus CPP; patients with cervical spine injury or certain cardiovascular conditions may experience discomfort or have contraindications, necessitating careful screening and monitoring.

The observed pre–post improvements over one shift in this case align with a quasi-experimental study (Moh Rizky Y. Abdullah et al., 2022), which found significant differences in blood pressure, heart rate, respiratory rate, and SpO_2 before versus after intervention **(**$p = 0.001$**).** Taken together, our within-case observations and the supporting literature indicate that 30° head-up positioning is an effective first-line, non-pharmacological strategy for symptom control and physiologic stabilization in mild head injury, provided that hemodynamic stability and spinal safety are ensured.

CONCLUSION

Based on the data analysis, Mr. F an adolescent with mild head injury and acute pain residing in Kepanjen, Malang was managed with a 30° head-up position as a non-pharmacological intervention aimed at lowering intracranial pressure and relieving headache. The position was maintained for approximately 30 minutes per session.

Following implementation, the patient reported reduced pain over the scalp hematoma and appeared calmer and more relaxed. In summary, the 30° head-up position produced a clinically meaningful effect within a ~30-minute application period and is a reasonable supportive measure for patients with mild head injury.

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