

**ISSN 2597- 6052**DOI: <https://doi.org/10.56338/mppki.v7i6.5222>**MPPKI****Media Publikasi Promosi Kesehatan Indonesia**  
*The Indonesian Journal of Health Promotion***Review Articles****Open Access****Polyurethane Foams Combined with Vaseline Prevents 1st Degree Pressure Injuries in Neurosurgical Surgery Patients: Literature Review****Ester Dinar Lumbantoruan<sup>1\*</sup>, M. Astrid<sup>2</sup>**<sup>1,2</sup>Program Pascasarjana STIK Sint Carolus Jakarta JL. Salemba Raya No 41; Jakarta Pusat 10440; Indonesia\*Author Correspondence: [esterdinar3005@gmail.com](mailto:esterdinar3005@gmail.com)**ABSTRACT**

**Introduction:** In the world of healthcare, the prevention of pressure injuries in neurosurgical patients in the operating room is an important aspect to prevent serious complications, such as infection and impaired circulation. Grade 1 pressure injuries, although often considered minor, can have a serious impact on patients' recovery and quality of life. Therefore, effective prevention strategies are urgently needed.

**Objective:** This literature review aims to evaluate the use of Polyurethane Foams combined with Vaseline as a method of preventing 1st degree pressure injuries in neurosurgical patients in the operating room.

**Methods:** The method of writing this literature review article uses a narrative review approach. The data used is secondary data obtained from several databases such as Google Scholar, PubMed, Science Direct, and Research Gate. The literature search in the preparation of the article uses a period of publication years ranging from 2016 to 2024.

**Results:** Preliminary results show that this combination can significantly reduce the risk of 1st degree pressure injuries.

**Conclusion:** Polyurethane Foams and Vaseline were selected based on their specific properties which were considered to support healing and provide protection. The Munro Scale measurement tool was used as a reference for interventions carried out in moderate and high-risk patients.

**Keywords:** Polyurethane Foams; Vaseline; Neurosurgery; Operating Room; Pressure Injuries; Patient Quality of L

## INTRODUCTION

In healthcare, pressure injuries prevention is an important aspect of caring for patients, especially those undergoing neurosurgical procedures in the operating room. Pressure injuries can lead to serious complications, including infection and impaired circulation, which can worsen the patient's health condition (1). Therefore, the development of effective prevention methods is crucial in ensuring optimal patient care quality. Grade 1 pressure injuries, although often considered a minor issue, can be a serious problem, especially in the context of neurosurgical patients undergoing procedures in the operating room. A study in Taipei found that the incidence of pressure ulcers immediately and thirty minutes later was 9.8% (29/297) and 5.1% (15/297), respectively. Using a logistic regression model, statistically significant associated risk factors statistically associated with immediate pressure ulcers and thirty minutes later included age at surgery, type of anesthesia, type of operating position, type of surgery, Munro score, and number of nursing interventions after adjustment for confounding factors (10). The occurrence of pressure injuries in neurosurgical patients can have a serious impact on patients' recovery and quality of life (6). Therefore, it is important to identify effective prevention strategies to reduce the risk of Grade 1 pressure injuries in neurosurgical patients.

This literature review aims to evaluate the effectiveness of using Polyurethane Foams combined with Vaseline as a strategy to prevent 1st degree pressure injuries in neurosurgical patients in the operating room. The main reason behind choosing this topic is the need to focus on the prevention of Grade 1 pressure injuries which are often overlooked. Although it may seem like a minor issue, Grade 1 pressure injuries can cause significant discomfort to the patient, slow down the recovery process, and even open up opportunities for more serious complications (3). Polyurethane foams, a type of material that exhibits special properties, have attracted attention as a potential solution to prevent pressure injuries. There is preliminary evidence to suggest that when polyurethane foams are used together with vaseline, this combination can significantly reduce the risk of 1st degree pressure injuries in neurosurgical patients in the operating room (6). Therefore, this study was designed to further investigate the effectiveness of using a combination of polyurethane foams and Vaseline as a preventive measure in treating neurosurgical patients.

The chosen prevention strategy, the use of Polyurethane Foams in combination with Vaseline, was chosen based on their specific properties that are believed to provide protection and support the healing process. Polyurethane Foams, known for their ability to absorb moisture and provide gentle support to the skin, are expected to create a supportive environment for wound healing without causing excessive friction to the skin Walker, R. (7). Meanwhile, Vaseline is expected to enhance the adaptability of Polyurethane Foams to the skin surface, providing the necessary additional protective layer.

It is important to recognize that Grade 1 pressure injuries not only have a physical impact, but can also contribute to the psychological impact and quality of life of the patient. In the context of neurosurgical patients, where optimal recovery and patient comfort are top priorities, pressure injuries prevention is crucial (6).

The research sources that will be accessed in this literature review include recent scientific articles, medical journals, and related books that have relevance to the use of Polyurethane Foams and Vaseline in the prevention of Grade 1 pressure injuries. By detailing the information from these studies, this literature review is expected to provide a more comprehensive understanding of the effectiveness of these strategies in the context of neurosurgical patients.

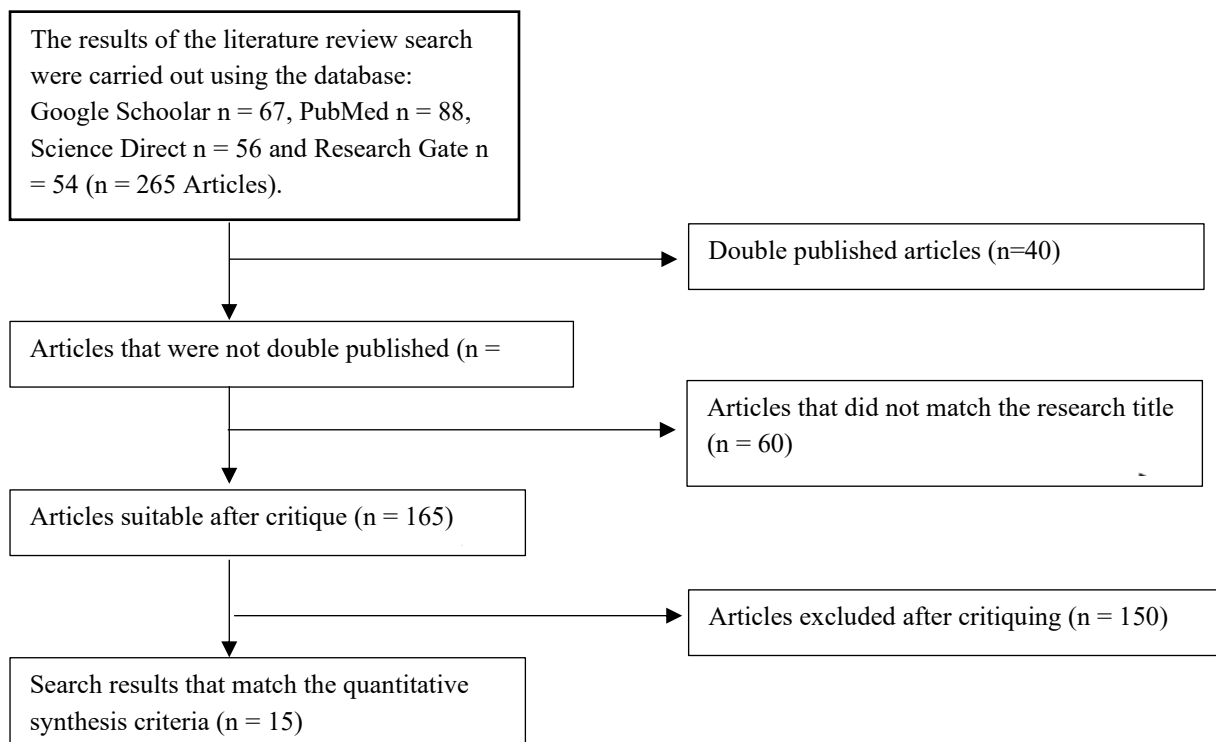
By delving into the results of previous studies, it is hoped that this literature review can provide a solid foundation to develop better clinical practice guidelines, provide more informed recommendations to healthcare practitioners in the operating room, and promote faster and safer recovery for neurosurgical patients. Through these efforts, it is hoped to improve our understanding of the need to prevent Grade 1 pressure injuries in neurosurgical patients and strengthen preventive approaches in daily clinical practice.

## METHODS

This literature review study uses a narrative review approach. The data used is secondary data obtained from several databases: Google Scholar, Pubmed, Science Direct, Proquest and Research Gate. Literature searches in the preparation of articles with journal publications from 2016 to 2024. In the search for keywords used using two languages, the first is Indonesian with keywords, "polyurethane foams", "vaseline", "neurosurgery", "operating room", "pressure injuries", "quality of life", and English "polyurethane foams", "vaseline", "neurosurgery", "operating room", "pressure injuries", "patient quality of life".

Articles obtained from various databases will be selected based on the inclusion and exclusion criteria determined by the author. Inclusion criteria: Articles that match the keywords that have been determined above, the year of publication in the range of 2016-2024 and research articles can be accessed in full (full text). Exclusion criteria: Articles in the form of reviews, surveys and reports and articles that are not suitable. After the articles obtained are in accordance with the inclusion and exclusion criteria, the articles will be summarized in the form of a PICOT Analysis table which includes the name of the population, intervention, comparison, outcomes, time, title, and the name of the researcher. The articles obtained will then be discussed to draw conclusions from the entire article. The selected articles that have met the standards for review and in accordance with the inclusive and exclusive

criteria were obtained as many as 265 articles, then screening was carried out there were double publications and some articles did not get full text access as many as 40 articles, titles did not match the research as many as 60, after being criticized as many as 150 articles did not match. The remaining articles that are in accordance with the criteria of the study are 15 articles.



## RESULTS

**Table 1.** Literature Analysis

No.	Researcher Name	Year	Journal Name	Research Title	Summary of Research Results
1	Yana Zahara, Ratna Dewi, Endang Saptarin	2014	Indonesian Journal Of Nursing Health Science	Effectiveness of White Petroleum Jelly for Stage 1 Pressure Wound Treatment in Siloam Hospitals Lippo Village Inpatient Room	Data analysis using the Wilcoxon Signed Rank Test, p value <0.05, then Ho is rejected, meaning that there is a difference in pressure injuries before and after the administration of white jelly petrolleum, so it can be concluded that interventions such as the use of white jelly petrolleum have an effect on stage I pressure injuries treatment.
2	Benedetta Vasselli, Luca Spazzapan, Patrizia Sartorato, Evelin Makuc, Laura Grezar, Vittorio Ramella, Giovanni Papa	2022	Official Journal of Italian Society of Microsurgery and Italian Society of Plastic Reconstructive & Aesthetic Surgery	Pressure ulcers incidence in a perioperative neurosurgical setting	Evaluation of the incidence of surgery-related pressure injuries (SRPU) in patients undergoing perioperative neurosurgery at Cattinara Hospital.

					Assess the incidence of surgical-related pressure injuries, duration of surgery, location and stage of SRPU, and other factors that may affect the healing process.
3	Dongxue Li, Jia Tang, Xiuni Gan	2018	Int J Clin Exp Med	Reliability and validity of the Munro Scale on the assessment of pressure ulcer risks in adult perioperative patients: a cross-sectional study	The main outcome of this study was the validity and reliability of the Munro Scale in adult perioperative surgery patients. Validity was measured by content validity index (CVI), while reliability was measured by intra-class correlation coefficient (ICC) and internal consistency analysis (Cronbach's $\alpha$ ). The Munro Scale was assessed in terms of validity using CVI and reliability using ICC and Cronbach's $\alpha$ . The results showed that the Munro Scale has a good level of validity and reliability.
4	Sibila Lilian Osis RN & Solange Diccini RN	2019	International Journal Of Nursing Health Science	Incidence and risk factors associated with pressure injury in patients with traumatic brain injury	The prevalence of pressure injuries, the risk factors involved, and the relationship between the presence of pressure injuries and mortality within 30 days of hospitalization. The prevalence of pressure injuries in 240 patients was 18.8%. The severity of traumatic brain injury correlates with the severity of pressure injury. Risk factors for pressure injury involve old age, noradrenaline use, and moderate or severe classification of traumatic brain injury. The presence of pressure injuries was associated with mortality within 30 days of hospitalization.
5	Written by Mustafa Qazi, Almas F. Khattak, and Muhammad T. Barki.	2022	Cureus	Pressure Ulcers in Admitted Patients at a Tertiary Care Hospital.	The primary outcome was the frequency of pressure ulcers in various specialized wards in the facility, including the COVID-19 ward.

6	Lumin Lei, Ti Zhou, Xinlin Xu, and Lihong Wang	2022	Journal of healthcare engineering	Munro Pressure Ulcer Risk Assessment Scale in Adult Patients Undergoing General Anesthesia in the Operating Room	This study shows that the Munro Pressure Ulcer Risk Assessment Scale has a good ability to predict the risk of pressure ulcers in surgical patients undergoing general anesthesia, especially in the postoperative situation. Sensitivity and specificity analysis of Munro and Braden Scale revealed the high performance of Munro Pressure Ulcer Risk Assessment Scale. Area under the ROC curve (AUC) measurements confirmed the effectiveness of each scale, with the Munro Scale showing significant values. In addition, the independent risk factors identified, such as duration of surgery and anesthesia, as well as coma status and diabetes, provided additional insight into the variables associated with pressure ulcer risk in these patients.
7	Ying Wu, Zhiqun Jiang, Shuzhen Huang, Bin Shi, Chan Wang and Yu Zeng	2021	CLINICAL RESEARCH	Identification of Risk Factors for Intraoperative Acquired Pressure Injury in Patients Undergoing Neurosurgery: A Retrospective Single-Center Study	The results showed that out of a total of 465 patients undergoing neurosurgery, there was an incidence of Pressure Injuries Acquired during Surgery (IAPI) in 69 patients, reaching an incidence rate of 14.8%.
8	Dongxue Li1, Jia Tang1, Xiuni Gan2	2018	Somantic scholar	Reliability and validity of the Munro Scale on the assessment of pressure ulcer risks in adult perioperative patients: a cross-sectional study.	Reliability and validity of the Munro Scale for assessing pressure ulcer risk in adult perioperative patients.
9	Fatma Balci, Ezgi Seyhan Ak, Cemile Çelebi, Selda Igeci Sanli, Ayfer Özbaş	2023	Journal of basic and clinical health science	Determining the Risk of Intraoperative Pressure Injury in Patients Undergoing Elective Cranial Surgery	In this study, the results of the pressure injury risk assessment in patients undergoing elective cranial surgery showed that the majority of patients had a low risk of pressure injury.
10	Ying Wu and Zhiqun Jiang	2021	CLINICAL RESEARCH	Identification of Risk Factors for Intraoperative	Results from a research study regarding

					Acquired Pressure Injury in Patients Undergoing Neurosurgery: A Single-Center Retrospective	intraoperatively acquired pressure injury (IAPI) in patients undergoing neurosurgery included the identification of several risk factors associated with IAPI. These risk factors included being overweight, prone or lateral positioning, use of a head frame, operative duration of 4 to 8 or $\geq 8$ hours, as well as having high serum albumin levels and use of memory sponge pads, which were found to decrease the risk of IAPI in patients undergoing neurosurgery.
11	Lumin Lei, <sup>1</sup> Ti Zhou, <sup>1</sup> Xinlin Xu, <sup>1</sup> and Lihong Wang	2023	Hindawi Journal of Healthcare Engineering		Munro Pressure Ulcer Risk Assessment Scale in Adult Patients Undergoing General Anesthesia in the Operating Room	Prediction of acute pressure ulcers after surgery. Our results show that The intraoperative Munro Pressure Ulcer Risk Assessment Scale is highly effective for predicting postoperative pressure ulcer risk ulcers in surgical patients requiring general anesthesia.
12	Rizki Hidayat, Naziyah, Agnes Dea Saputri	2023	Mahalayati Journal Portal		EFFECTIVENESS OF POLYURETHANE FOAM DRESSING AGAINST CONTROL HYPERGRANULATION IN CHRONIC WOUNDS	This study aimed to control hypergranulation in chronic wounds, using the BWAT Score as an outcome measurement instrument. Results showed that a total score value $< 32$ indicates wound regeneration, while a total score value $> 32$ indicates wound degeneration. In this study, 36% of respondents were in the late elderly age group (56-65 years), with a predominance of male gender (56%) and the last education level of high school (44%). The results showed that polyurethane foam dressing was effective in reducing hypergranulation in chronic wounds, with a statistical significance level that reached p-value = 0.000.

13	Chenyu Shi, Chenyu Wang, He Liu, Qiuju Li, Ronghang Li, Yan Zhang, Yuzhe Liu, Ying Shao and Jincheng Wang	2020	Front Biotechnol.	Bioeng	Selection of Appropriate Wound Dressing for Various Wounds	The main results of the study included the speed of healing and pain management at the donor site. The study discusses the significance of reducing pain, stress, and improving patients' quality of life. The article also mentions the broader context of wound management, emphasizing the importance of effective wound closure in preventing infection, accelerating wound healing, and reducing pain.
14	Eberhardt, T. D., de Lima, S. B. S., de Avila Soares, R. S., Silveira, L. B. T. D., Rossarola Pozzebon, B., Reis, C. R., Dos Santos, K. P. P., & Alves, P. J. P.	2021	International Wound Journal		Prevention of pressure injury in the operating room: Heels operating room pressure injury trial	The results of this study showed that multilayer silicone foam was more effective in preventing pressure injuries caused by surgical positioning on the heels of patients undergoing elective surgery compared with transparent polyurethane film. The incidence of pressure injuries in the intervention group was significantly lower compared to the control group (26.7 percent vs. 43.7 percent, respectively), with a relative risk of 0.57. In addition, the pressure injury-free time was significantly longer in the intervention group (57.5 hours) compared to the control group (43.9 hours).
15	Haleem, S., Mihai, R., Rothenfluh, D. A., & Reynolds, J.	2020	International Wound Journal		Preventing iatrogenic facial pressure ulcers during spinal surgery: Prospective trial using a novel method and review of literature	The primary outcome was the development of a pressure ulcer (PU) of at least Grade 2 on the third postoperative day. No pressure ulcers were noted in this study. One patient developed erythema, which resolved after 24 hours. All patients were satisfied with the treatment received.

## DISCUSSION

Pressure injuries prevention is an important aspect of caring for patients, especially those undergoing neurosurgical procedures in the operating room. Pressure injuries can lead to serious complications, including infection and impaired circulation, which can worsen the patient's health condition (1). Therefore, the development of effective prevention methods is crucial in ensuring optimal patient care quality. Grade 1 pressure injuries, although often considered a minor issue, can be a serious problem, especially in the context of neurosurgical patients undergoing procedures in the operating room. A study in Taipei found that the incidence of pressure ulcers immediately and thirty minutes later was 9.8% (29/297) and 5.1% (15/297), respectively. Using a logistic regression model, statistically significant associated risk factors statistically associated with immediate pressure ulcers and thirty minutes later included age at surgery, type of anesthesia, type of operating position, type of surgery, Munro score, and number of nursing interventions after adjustment for confounding factors (4).

It is important to recognize that Grade 1 pressure injuries not only have a physical impact, but can also contribute to the psychological impact and quality of life of patients. In the context of neurosurgical patients, where optimal recovery and patient comfort are top priorities, prevention of pressure injuries is crucial (9). The occurrence of pressure injuries in neurosurgical patients can have a serious impact on patient recovery and quality of life (6). Therefore, it is important to identify effective prevention strategies to reduce the risk of Grade 1 pressure injuries in neurosurgical patients.

## CONCLUSIONS

Based on the research results presented, the conclusions from various studies related to pressure ulcer risk show several important findings. These include the effectiveness of using the intraoperative Munro Pressure Ulcer Risk Assessment Scale to predict postoperative pressure ulcer risk, the validity and reliability of the Munro Scale in assessing pressure ulcer risk in adult perioperative patients, and the identification of risk factors for intraoperative pressure injury. These results provide a better understanding of the prediction, prevention and management of pressure ulcers in patients undergoing certain medical treatments.

Pressure injuries prevention is an important aspect especially in neurosurgical patients in the operating room. Grade 1 pressure injuries, although considered a minor problem, can have a serious impact on patient recovery and quality of life. Polyurethane Foams combined with Vaseline emerged as a potential prevention strategy, showing promising preliminary evidence.

This strategy was chosen because the combination of the unique properties of Polyurethane Foams and Vaseline can create an environment that supports wound healing without causing excessive friction to the skin. Pressure injuries not only have a physical impact, but can also contribute to the psychological impact and quality of life of patients, particularly in the context of neurosurgical patients where optimal recovery and patient comfort are top priorities.

## SUGGESTION

The studies that have been reported show positive results regarding the use of Polyurethane Foams and Vaseline as prevention of Grade 1 pressure injuries. However, further research is needed to validate and reproduce these results in various contexts and patient populations.

The results of this literature review can serve as a strong basis for developing better clinical practice guidelines, providing more informed recommendations to healthcare practitioners in the operating room, especially in neurosurgical patients.

Despite the focus on the physical aspects of pressure injuries, it is important to better understand the psychological impact on neurosurgical patients. Future studies could investigate the psychological effects of Grade 1 pressure injuries and develop interventions that can support this aspect.

The few studies that have been reported involved limited samples. Further studies involving larger samples and population variations may provide a more thorough understanding of the effectiveness of these prevention strategies.

Conduct a cost-benefit analysis of the use of Polyurethane Foams and Vaseline in the prevention of pressure injuries, weighing the cost of procurement and implementation against the benefits in reducing complications and improving patient quality of life.

By engaging with these efforts, it is hoped to continue to increase understanding of the need for prevention of Grade 1 pressure ulcers in neurosurgical patients and strengthen preventive approaches in daily clinical practice.



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