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ORIGINAL RESEARCH

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PREVALENCE, PREVENTION, AND WOUND CARE OF PRESSURE INJURY IN STROKE PATIENTS IN THE NEUROLOGY WARD

Rini Riandini*, Etika Emaliawati, Ristina Mirwanti

Faculty of Nursing, Universitas Padjadjaran, Indonesia

*Corresponding author:

Rini Riandini

Faculty of Nursing, Universitas Padjadjaran
Jl Raya Bandung – Sumedang Km. 21, Sumedang 45363 Jawa Barat
Bandung, Indonesia
Email: riniiriandini92@gmail.com

Abstract

Background: Stroke patient has a risk of experiencing pressure injury, which could affect patient's life and quality of life; therefore, optimum pressure ulcer prevention should be done. Patients experiencing pressure ulcer should be given appropriate care, to prevent infection and worse conditions.

Objective: To identify the prevalence, prevention and treatment of pressure injury of stroke patients in the neurological ward.

Methods: This research was a quantitative descriptive research using Landelijke Prevalentiemeting Zorgproblemen instrument. The samples were collected using consecutive sampling method with inclusion criteria of stroke patients experiencing paraplegia, which obtained 30 respondents. Data were presented in frequency distribution format.

Results: The result showed that the prevalence of pressure injury was 3.3% of degree III and brought from home. Based on risk assessment, 43.3% of patients had a very high risk of getting pressure injury, and 56.7% had changed position, 100% had received nutritional support but 80% of patients had not received health education and 83.3% did not get a pillow on their heels, and 100% did not get pressure injury mattress, massage, moisturizing cream and oil. Treatment of pressure injury was using 0.9% NaCl liquid with hydrocolloid dressing.

Conclusion: It can be concluded that there are still some patients experiencing pressure injury and in terms of items of pressure injury prevention, which often done is malnutrition prevention, the least are the changes of position in using pillows, and in health education. The one that have never been done are the use of oil, moisturizing cream, massage and pressure air mattress. The injury treatment provided to the patient has been adequate. The suggestion that can be given is the preparation of standard operating procedure, leaflets and the provision of pressure air mattress.

Keywords: pressure injury; wound care; prevalence; prevention; stroke patient

INTRODUCTION

Pressure injury has many names such as pressure ulcer, bed sores, and pressure sore ([Engels et al., 2016](#)). National Pressure Ulcer Advisory Panel NPUAP defines pressure injury as a localized injury to the skin or tissue caused by the suppression of soft tissue between the protruding bone and the outer surface for a long period of time ([NPUAP,](#)

[2016](#)). Potter & Perry stated that pressure injury is a wound on the skin and / or underlying tissue, usually caused by a bony protrusion, as a result of pressure or combination of pressure with shear and / or friction forces. Respectively, it can be concluded that pressure injury is a wound on the skin or tissue caused by depressed tissue

by protruded bone for a long period of time ([Potter & Perry, 2014](#)).

Pressure injury becomes an important issue especially on patients with mobilization impaired. One of the conditions with a risk of experiencing impaired mobilization is stroke. Stroke is a condition that arises as a result of blood circulatory disorders in the brain that causes brain tissue death resulting in a person suffering paralysis or death ([Batticaca, 2008](#)). Motoric disorders in stroke patients occupy the largest number, i.e. 90.5%, which means that almost all patients experiencing motoric disorders ([Misbach, 2011](#)). These motoric disorders include hemiplegia, i.e. a weakness that occurs on one side of the body and the most severe is permanent paralysis which make it difficult for the patients to move freely, easily and regularly to meet their basic needs as a human being ([Mubarak, Indrawati, & Susanto, 2015](#)).

A research found that the most medical diagnosis causes pressure injury is stroke, i.e. 53.7% ([Mutia, Pamungkas, & Anggraini, 2015](#)). This is in line with another study which stated that about 50% of pressure injury patients are with medical diagnosis of stroke ([Okatiranti, Sitorus, & Tsuawabeh, 2013](#)). Therefore, it can be said that the incidence of pressure injury is more prevalent in patients with medical diagnosis of stroke.

Research showed that stroke patients experiencing pressure injury have significantly higher risk of being infected not only at the wounds, but also other infections such as urinary tract infections and pneumonia ([Lee et al., 2016](#)). Moreover, stroke patients with pressure injury increase mortality rate more than stroke patients without pressure injury. The study above showed that there is an increase in complications in stroke patients experiencing pressure injury.

To avoid the impact that will be generated, prevention should be implemented optimally. In addition, patients who have experienced should be given appropriate treatment to avoid infection or worsening pressure injury to a higher degree. There is no data showing how

far the prevention and treatment of pressure injury has been given to stroke patients, so researchers feel it is important to examine the prevalence, prevention and treatment of pressure injury in stroke patients.

METHODS

Study design

This study used descriptive research with quantitative approach.

Setting

This research was conducted in Neurology Ward One of Central Public Hospital in Indonesia in September 2017 until March 2018.

Sample

The number of samples obtained was 30 patients by using consecutive sampling method. Inclusion criteria in this study were immobilized stroke patients with criteria: 1) experienced paraplegia, 2) who had been hospitalized for at least three days.

Instrument

The instrument that used in this research was LPZ (Landelijke Prevalentiemeting Zorgproblemen), the LPZ questionnaire was developed in 1997 by Halfens, Bours, Lubbers, Piersma and Buss ([van Nie-Visser et al., 2013](#)). The LPZ questionnaire was translated into Indonesian ([Y Amir, 2015](#)), the content validity index of the questionnaire ranged from 0.50 to 1.00. This instrument consists of several parts, the first part contains data on the characteristics of respondents, other information related to patient history, the second part contains pressure injury prevention measures consisting of Braden scale and the third part about pressure injury that has occurred in patients.

Ethical consideration

This study was approved by the ethical committee on health research RSUP Dr. Hasan Sadikin Bandung with IRB approval number LB.04.01/a05/ec/354/XII/2017.

Data analysis

The analysis in this study was conducted with univariate to explain thoroughly and deeply about prevalence, prevention and treatment of pressure injury to stroke patients. Data analysis was the univariate that carried out on each variable of research result. Generally, in this analysis only produces distribution and the percentage of each variable.

RESULTS

From **Table 1**, most of the respondents were female (53.3%), mostly aged more than 65 years (56.7%), a small proportion of respondents had a history of bed rest (3.3%), and all respondents had no history of experiencing pressure injury for the last five years (100%).

Table 1 Frequency Distribution of Respondent Characteristics of Stroke Patients in the Neurology Care Room (n=30)

	Variable	Quantity	%
Sex	Male	14	46.7%
	Female	16	53.3%
Age	55-65	13	43.3%
	>65	17	56.7%
Bed Rest History	Yes	1	3.3%
	No	29	96.7%
Pressure Injury History last 5 years	No	30	100%

From **Table 2**, a small percentage of respondents had a Pressure injury with category 3, long-suffering less than or equal to 2 weeks, started suffering at home, Location of pressure injury was on the Coccygeal bone (3.3%).

And based on **Table 3**, almost half of the respondents had a very high risk of being exposed to pressure injury (43.3%), most

respondents got a change of position (56.7%), all respondents received nutritional support (100%), almost all respondents did not get health education (80%), almost all respondents did not use pillow under the heel (83.3%), all respondents did not use oil (100%), all respondents did not use moisturizing cream (100%), all respondents did not get massage (100%), and all respondents did not use anti-pressure injury mattress (100%).

Table 2 Frequency Distribution of Stroke Patient in the Neurology Ward (n=30)

Variable	Category	Quantity	%
Pressure Injury	Yes	1	3.3%
	No	29	97.7%
Category of Pressure Injury	Category 3	1	3.3%
Length of Pressure Injury suffered	≤ 2 weeks	1	3.3%
Start Suffering	Home	1	3.3%
Pressure Injury Location	Coccygeal bone	1	3.3%

Table 3 Frequency Distribution of Pressure Injury Prevention in Neurology Ward (n = 30)

Variable	Category	Quantity	%
Risk Assessment of Pressure Injury	Moderate	6	20%
	High	11	36.7%
	Very High	13	43.3%
Position Changes	Yes	17	56.7%
	No	13	43.3%
Malnutrition Prevention	Yes	30	100%
Health Education	Yes	6	20%
	No	24	80%
Pillow	Yes	5	16.7%
	No	25	83.3%
Oil	No	30	100%
Moisturizing Cream	No	30	100%
Massage	No	30	100%
Pressure Air Mattress	None	30	100%

Table 4 Frequency Distribution of Wound Care in Stroke Patients in Neurology Ward (n = 1)

Variable	Category	Quantity	%
Cleaning the Wound	Normal saline or <i>portable water</i>	1	100%
Debridement	No	1	100%
Wound Dressing	<i>Hydrocolloids</i>	1	100%

Based on **Table 4**, all respondents who experienced pressure injury wound cleaned with normal saline, no debridement, wound dressing used Hydrocolloids (100%).

DISCUSSION

Pressure injury prevalence

Based on the result of the study found that there was one patient who experienced pressure injury. According to NPUAP (2016) pressure injury is divided into four levels of pressure injury degree I, pressure injury degree II, pressure injury degree III, and pressure injury degree IV. The result showed the patient was in degree III. Pressure injury degree III is a complete loss of tissue, where tissue damage or necrosis reaches subcutaneous or deeper. The wound looks like a deep hole. Muscles, tendons, ligaments and bones are not visible.

Based on the results of this study patient suffering from pressure injury less than two

weeks, in line with research by Amir (2015) that half of the patients had got pressure injury ≤ 2 weeks. Two weeks period is recommended to evaluate the development of wound healing (Pullen & Anhold, 2012). The length of this period can be used for nurses to detect early complications and to evaluate whether the treatment plan is continued or changed. In addition, once the nurse has information about how long the patient has been suffering pressure injury, it aims to inform the patient and family about the estimated duration of treatment and monitor the healing process.

The results of the study showed that patient's pressure injury has emerged at home. This might be related to a lack of family's knowledge in treating stroke patients who are immobilized, especially regarding preventative measures of pressure injury. Stroke patients who experience mobility impairment would find it difficult to change their position independently. Therefore, family assistance or care is vital to avoid the occurrence of pressure injury in the patient. The results of this study

are consistent with what was stated by Tuffaha et al. who found that 89.4% preliminary pressure injury took place at home. Similar results were also found by Amir (2015), half of the pressure injury (60%) had occurred before admission to the hospital and was a severe pressure injury category III and IV (42.3%) ([Tuffaha, Roberts, Chaboyer, Gordon, & Scuffham, 2016](#)).

The patient's pressure injury was present in the coccyx bone region. This coccyx bone is an area susceptible to pressure injury because of pressure by the bone and added with the long-time pressure. Pressure injury can occur anywhere on the surface of the body if it is exposed to continuous pressure. In line with previous research which stated that the areas most at risk for exposure to pressure injury are the sacral area (30-49%), heel (19-36%), ischium (6-11%), malleolus (7-8%), elbows (5-9%), iliac (4%), knees (3-4%), and the rest usually occur in the chin, occipital, scapula, pretibial and spinous process ([Nix, Bryant, & Nix, 2012](#)). Similarly, Palese et al. found that pressure injury is the most common in the sacral area of 64.4% ([Palese et al., 2015](#)).

Pressure injury prevention

Prevention of Pressure injury is very important to carry out because if it has happened, it might lead to various disadvantages for the patient, patient's family, nurses and hospital. The recommended prevention from NPUAP consists of risk assessment, skin care (moisturizing cream, oil and massage), position and reposition (2-3 hours without pressure injury mattress and 4-6 hours if using pressure injury mattress), preventing or treating malnutrition and dehydration, and education or health education ([NPUAP, 2016](#)).

Based on the risk assessment, respondents who were at very high-risk experienced Pressure injury (43.3%), high risk (37.7%) and moderate risk (20%). This risk assessment was measured by Braden Scale. According to Braden Scale, the actions to prevent Pressure injury in patients with a very high Braden

Scale are repositioning or changing the patient's position regularly, supporting the patient to mobilize, protecting the patient's heel in order to prevent to be exposed the bed directly, using surface support and set the patient's skin moisture, setting lateral position of 30° by using a foam pillow, and using pressure air mattress.

The routine use of the Pressure injury risk assessment tool in the clinical care setting in stroke patients is considered necessary for a comprehensive Pressure injury prevention program. Planning preventive care according to Braden Scale may be more effective in some cases compared to other measures ([Mohamed & Weheida, 2014](#)). However, study showed that there were nurses' perceived obstacles in the risk assessment of Pressure injury that was lack of training ([Moore, Cowman, & Conroy, 2011](#); [Tallier et al., 2017](#)). Less trained nurses will have an impact on their knowledge as well as skills when conducting the risk assessment of Pressure injury to a patient.

On item changing position, the results showed that majority of respondents changed position. It is in accordance with previous research ([Yufitriana Amir, Tan, Halfens, Lohrmann, & Schols, 2017](#)) in some existing hospital in Indonesia, found that the most frequent preventive measure is repositioning. Changing the position can boost blood circulation and improving the regulation of the body's metabolism, restoring the physiological work of vital organs and also allowing the pressured skin to be exposed to the air ([Simanjuntak & Sirait, 2013](#)).

Changing position to the patient was not yet in accordance with the NPUAP recommendation in which changing position is suggested every 2-3 hours in patients without using pressure injury mattress and 4-6 hours in patients using pressure air mattress. In the neurology ward, there were no patients who used support surfaces that meant each patient who has risk should be changed position every 2-3 hours. The nurses' difficulties to change position in the ward are related to the high workload of

nurses and the lack of nurses while changing the patient's position requires assistance from another nurse. In addition, evenly, the patients in the neurology ward are those who need total care, the full help from the nurse, it will inflict on the longer time in carrying out the intervention. In line previous research ([Qaddumi & Khawaldeh, 2014](#)) which stated that patient repositioning becomes one of pressure injury preventions which is perceived difficult by nurses, it is related to the lacking number of nurses while patient repositioning needs assistance from another nurse. It causes pressure injury prevention in repositioning item becomes less than optimal.

In nutritional variable the results showed that all respondents got malnutrition or dehydration prevention measures in the form nutritional and fluids status assessment, being monitored and treated while the results were reported, then being provided nutritional therapy based on recommendations. In the neurology ward, the nurse must perform nutritional screening of the patient within no more than 12 hours after the patient takes into the inpatient ward. Study ([Tuffaha et al., 2016](#)) mentioned that good nutrition intake of patients could decrease the prevalence of pressure injury exposure in patients at high risk of pressure injury. Nutrition is one of the important supporting factors to maintain healthy skin condition of patients and avoid pressure injury.

The sub-variables of health education to prevent pressure injury in this study showed that only a small proportion of respondents received a health education. Health education criteria given to patients in this study was health education using media leaflet aid, while in the neurology ward, the health education was largely given without using the media. Therefore, the result of this study might indicate that health education provided has not been effectively done. Information and health education on patients and/or families should be provided on the continuous and comprehensive basis in order to initiate the family's participation in pressure injury prevention. It occurred because of lack of time the nurses had to perform health education to

patients due to the high workload, where one nurse handled the average of six patients with total and partial care conditions. Health education related pressure injury could be assisted by using leaflet media. Once the nurses do not have enough time to perform health education, they can give leaflet about how to prevent pressure injury to patient's family.

Research ([Sulastri, Effendy, & Haryani, 2016](#)) showed that there was an impact of health education about pressure injury prevention on family knowledge and involvement in preventing pressure injury in bed rest patients. Nurses who have the role as educators should perform health education to patients or the families to increase prevention of pressure injury.

In the sub-variable pillow provision on the foot area found almost all respondents did not use a pillow at the bottom of the foot. One of pressure injury preventions are with the provision of pillows in areas that have the risk of Pressure injury, such as heel and elbow area with the aim to minimize friction and pressure on the heel region to the mattress directly, as study ([Lahmann, Tannen, Dassen, & Kottner, 2011](#)) noted in the research that found the strongest predictor that causes pressure injury degrees I to IV is friction.

In this study, all patients did not use the moisturizing cream to protect the skin. Skincare is an independent nursing intervention that aims to maintain skin health. Skincare here means to maintain skin hygiene and skin moisture by giving lotions or creams. As research ([Lechner, Lahmann, Neumann, Blume-Peytavi, & Kottner, 2017](#)) revealed that dry skin causes damage to the skin barrier function and results in decreased elasticity, therefore, it is important to keep the patient's skin moist, either by lotion or body oil.

In sub-variable of using oil to protect skin, all respondents did not use oil to prevent Pressure injury. Based on the research ([Utomo, Dewi, & Abdurrasyid, 2014](#)), Nigella Sativa Oil is effective to prevent the occurrence of pressure

injury in bed rest patients. There is also an olive oil formula that can be applied to help prevent the emergence of pressure injury in patients, this treatment is low-cost and can be considered as an alternative treatment ([Lupiáñez-Pérez et al., 2013](#)).

In the massage variable found all respondents did not get a massage for pressure injury prevention. The recommended massage technique to give to the patient is effleurage which is slow and rhythmic hand movement, the massage passes distal to proximal and parallel to the long axis of tissue with medium pressure, massage is contraindicated when the tissue is inflamed and when the patient is prone to bleeding (ecchymosis), has abnormalities in the circulatory system (phlebitis, severe atherosclerosis), and has abnormal sensations due to stroke, diabetes, and treatment ([Duimel-Peeters, Halfens, Berger, & Snoeckx, 2005](#)). Massage at risky areas is administered once or twice daily in 15 minutes long of a single message that effective in preventing the patient's pressure injury ([Duimel-Peeters et al., 2005](#)).

Basically, the use of pillows, oil and moisturizer are the interventions that can be done by the patient's family independently. The cause of insufficient use of pillow, oil and moisturizer in pressure injury prevention in patients can be caused by the lack of families' knowledge about what family can do to prevent pressure injury. Since actually patients or families already had oil (such as eucalyptus oil) and moisturizing cream (like body lotion) but the family did not use it for pressure injury prevention in patients. The knowledge about the use of pillow, oil and skin moisturizer can be included in the pressure injury prevention leaflet that can later be used as a media of health education for patients and families.

The results of this study showed no single patient who used support surfaces. The neurology ward has two pressure air mattresses, but both mattresses were currently in disrepair and unusable. As referring to Braden Scale prevention guidelines, patients at very high risk of having a pressure injury

should use pressure air mattresses, it means 34.3% of patients at high risk of exposure to pressure injury in this study should use pressure air mattresses. According to previous study ([Mirwanti, Agustina, & Nuraeni, 2017](#)), to support the nurses in carrying out pressure injury prevention optimally, thus the addition of tools or facilities related to pressure injury prevention is necessary.

According to a study, it was found that the use of alternating pressure air mattress (APAM) was superior to the use of viscoelastic foam mattress (VFM) in pressure injury prevention in elderly patients with a moderate risk of pressure injury. The study showed that the risk of occurrence of pressure injury 7.57 times larger in the VFM patient group compared to the APAM patient group ([Sauvage et al., 2017](#)).

Wound care

The management of the pressure injury and the success of treatment should pay attention to few things, firstly, reducing pressure, debridement, controlling infection and the appropriate wound care ([Kirman & Geibel, 2018](#)). Wound care or appropriate wound care can speed up pressure injury healing or lower degree of pressure injury, avoid infection and the severity or increasing degree of pressure injury, which will certainly harm patients, nurses and hospitals.

Patients who experienced pressure injury in this study was performed wound cleansing using NaCl solution. Wound cleansing was performed once a day by nurses on morning duty. Wound care performed on patients using sterile technique, the wound looked clean, red and no pus or exudate and no undermining. It is explained that cleaning pressure injury aims to help ease the disposal of dirt and bacteria, water or NaCl commonly used as a cleanser for most pressure injuries ([Jordan, 2017](#)). In line with the recommendation of NPUAP & EPUAP ([National Pressure Ulcer Advisory Panel & European National Pressure Ulcer Advisory Panel, 2009](#)) that if the patient's

wound has no infection and no suspected infection then the solution used to clean the wound is NaCl. In patients of this study did not perform debridement because the wound had no necrotic tissue.

Wound dressing used by patients in this study was Hydrocolloids. The wound dressing was changed once a day during the morning duty; replacement of bandages was done after the wound was cleaned by using NaCl. The wound dressing is a major component of pressure injury treatment. The wound dressing is used to keep the wound area moist to boost healing and to keep the surrounding skin clean of wound exudates. The choice of wound dressing varies and should be based on the wound condition such as the depth of the wound and the amount of exudate, the aim is achieving clean wound healing with granulation tissue ([Pullen & Anhold, 2011](#)).

In general, keeping pressure injury wound remains moist ideal for accelerating healing or wound closure, according to Hunter & Edwards ([Hunter & Edwards, 2017](#)) that Hydrocolloids effectively close the wound and retain moisture, promote healing and autolysis, therefore, Hydrocolloids is suitable for pressure injury degree III. It is in line with the recommendation of NPUAP & EPUAP ([National Pressure Ulcer Advisory Panel & European National Pressure Ulcer Advisory Panel, 2009](#)) in the Pressure Ulcer Treatment Quick Reference Guide that Hydrocolloids can be used to bandage degree III pressure Injuries with no infection.

CONCLUSION

The result of research and data processing obtained the prevalence of pressure injury amounted to one patient with degree III and was brought from home. Pressure injury preventions mostly performed were pressure injury risk assessment and nutritional support, the least performed preventions were changing position, the use of pillows and health education, and the ones that have never been done were the use of oils, moisturizing creams

and pressure air mattresses. The wound treatment of pressure injury patients used NaCl liquid with hydrocolloid bandage.

The recommendations that researchers can provide to the hospital are supports for patients' needs to avoid pressure injury, such as preparing standard operating procedure on pressure injury prevention to facilitate nurses in maximizing intervention to prevent pressure injury, providing the supporting tools for the implementation of preventive action on pressure injury such as pressure air mattress. In addition, preparing leaflet about information on pressure injury prevention, which later becomes a means of conducting health education both to patients and families so that the family is expected to be involved in conducting pressure injury prevention. Suggestion for further research is a research related to pressure injury in community settings and factors related to family participation in preventive measures of pressure injury.

Declaration of Conflicting Interest

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Author Contribution

All authors equally contributed in this study.

References

- Amir, Y. (2015). *Quality of pressure ulcer care in Indonesian hospitals*. Netherlands: Maastricht University.
- Amir, Y., Tan, F., Halfens, R., Lohrmann, C., & Schols, J. (2017). Pressure ulcer prevalence and care in Indonesian hospitals: A multicenter, cross-sectional evaluation using an extended donabedian model. *Ostomy/Wound Management*, 63(2), 8-23.
- Batticaca, F. B. (2008). *Asuhan keperawatan pada klien dengan gangguan sistem persarafan [Nursing care for patients with neurological system disorder]*. Jakarta: Salemba Medika.
- Duimel-Peeters, I., Halfens, R., Berger, M., & Snoeckx, L. (2005). The effects of massage as a method to prevent pressure ulcers. A review of the literature. *Ostomy/Wound Management*, 51(4), 70-80.
- Engels, D., Austin, M., McNichol, L., Fencl, J., Gupta, S., & Kazi, H. (2016). Pressure ulcers: Factors

- contributing to their development in the OR. *AORN Journal*, 103(3), 271-281.
- Hunter, I. A., & Edwards, K. J. (2017). Managing pressure sores. *Surgery (Oxford)*, 35(9), 505-510.
- Jordan, A. (2017). Pressure injury in the ICU: Major reconstructive surgery required. In *Vignettes in Patient Safety-Volume 1*. London: InTech.
- Kirman, C. N., & Geibel, J. (2018). Pressure ulcers and wound care. Retrieved from <https://emedicine.medscape.com/article/190115-treatment-showall>
- Lahmann, N. A., Tannen, A., Dassen, T., & Kottner, J. (2011). Friction and shear highly associated with pressure ulcers of residents in long-term care—Classification Tree Analysis (CHAID) of Braden items. *Journal of Evaluation in Clinical Practice*, 17(1), 168-173.
- Lechner, A., Lahmann, N., Neumann, K., Blume-Peytavi, U., & Kottner, J. (2017). Dry skin and pressure ulcer risk: A multi-center cross-sectional prevalence study in German hospitals and nursing homes. *International Journal of Nursing Studies*, 73, 63-69.
- Lee, S.-Y., Chou, C.-L., Hsu, S. P., Shih, C.-C., Yeh, C.-C., Hung, C.-J., . . . Liao, C.-C. (2016). Outcomes after stroke in patients with previous pressure ulcer: a Nationwide matched retrospective cohort study. *Journal of Stroke and Cerebrovascular Diseases*, 25(1), 220-227.
- Lupiáñez-Pérez, I., Morilla-Herrera, J. C., Ginel-Mendoza, L., Martín-Santos, F. J., Navarro-Moya, F. J., Sepúlveda-Guerra, R. P., . . . Lupiáñez-Pérez, Y. (2013). Effectiveness of olive oil for the prevention of pressure ulcers caused in immobilized patients within the scope of primary health care: study protocol for a randomized controlled trial. *Trials*, 14(1), 348.
- Mirwanti, R., Agustina, H. R., & Nuraeni, A. (2017). Hambatan yang dirasakan oleh perawat dalam melaksanakan pencegahan luka tekan di ruang perawatan intensif [Obstacles perceived by nurses in implementing pressure wound prevention in intensive care unit]. *MEDISAINS*, 15(1), 1-9.
- Misbach, J. (2011). *Stroke*. Jakarta: Balai Penerbit FKUI.
- Mohamed, S. A., & Weheida, S. M. (2014). Effects of implementing educational program about pressure ulcer control on nurses' knowledge and safety of immobilized patients. *Journal of Nursing Education and Practice*, 5(3), 12.
- Moore, Z., Cowman, S., & Conroy, R. M. (2011). A randomised controlled clinical trial of repositioning, using the 30 tilt, for the prevention of pressure ulcers. *Journal of Clinical Nursing*, 20(17-18), 2633-2644.
- Mubarak, W. I., Indrawati, L., & Susanto, J. (2015). *Buku ajar ilmu keperawatan dasar [Teaching book of basic nursing science]*. Jakarta: Salemba Medika.
- Mutia, L., Pamungkas, K. A., & Anggraini, D. (2015). Profil penderita ulkus dekubitus yang menjalani tirah baring di ruang rawat inap RSUD Arifin Achmad Provinsi Riau periode Januari 2011-Desember 2013 [Profile of bed-rest patients with decubitus ulcer at inpatient unit of RSUD Arifin Achmad Provinsi Riau in the period of January 2011-December 2013]. *Jurnal Online Mahasiswa Fakultas Kedokteran Universitas Riau*, 2(2), 1-11.
- National Pressure Ulcer Advisory Panel, & European National Pressure Ulcer Advisory Panel. (2009). *Pressure ulcer TREATMENT: Quick reference guide*. Westford: National Pressure Ulcer Advisory Panel & European National Pressure Ulcer Advisory Panel.
- Nix, D., Bryant, R. A., & Nix, D. P. (2012). *Acute & chronic wounds: Current management concepts*. Missouri: Elsevier Mosby.
- NPUAP. (2016). National Pressure Ulcer Advisory Panel (NPUAP) announces a change in terminology from pressure ulcer to pressure injury and updates the stages of pressure injury. Retrieved from <http://www.npuap.org/national-pressure-ulcer-advisory-panel-npuap-announces-a-change-in-terminology-from-pressure-ulcer-to-pressure-injury-and-updates-the-stages-of-pressure-injury/>
- Okatiranti, O., Sitorus, R. E., & Tsuawabeh, D. (2013). Risiko terjadinya dekubitus berdasarkan tingkat ketergantungan pasien di ruang perawatan neurologi [Risk of decubitus based on the level of patient's dependence at neurological unit]. *Jurnal Keperawatan Padjadjaran*, 1(3).
- Palese, A., Saiani, L., Pota, I., Laquintana, D., Stinco, G., & Di Giulio, P. (2015). What is the healing time of stage II pressure ulcers? Findings from a secondary analysis. *Advances in Skin & Wound Care*, 28(2), 69-75.
- Potter, P. A., & Perry, A. G. (2014). *Fundamentals of nursing*. Jakarta: Salemba Medika.
- Pullen, R., & Anhold, M. (2011). Pressure ulcers: prevention and treatment. *MMW Fortschritt der Medizin*, 153(38), 80-83; quiz 84.
- Qaddumi, J., & Khawaldeh, A. (2014). Pressure ulcer prevention knowledge among Jordanian nurses: a cross-sectional study. *BMC Nursing*, 13(1), 6.
- Sauvage, P., Toufflet, M., Pradere, C., Portalier, F., Michel, J., Charru, P., . . . Beauchêne, F. (2017). Pressure ulcers prevention efficacy of an alternating pressure air mattress in elderly patients: E²MAO a randomised study. *Journal of Wound Care*, 26(6), 304-312.
- Simanjuntak, C. M., & Sirait, M. (2013). Pengaruh merubah posisi dan massase kulit pada pasien stroke terhadap terjadinya luka dekubitus di Zaal F RSU HKBP Balige [Effect of repositioning and skin massage in stroke patients on decubitus ulcer at Zaal F RSU HKBP Balige]. *Jurnal Keperawatan*, 1(2), 117-125.
- Sulastris, N. T., Effendy, C., & Haryani, H. (2016). Pengaruh pemberian pendidikan kesehatan terhadap pengetahuan dan keterlibatan keluarga dalam pencegahan dekubitus pada pasien tirah

- baring [Effect of health education on knowledge and family involvement in preventing decubitus in bedrest patients]. *Journal Ilmu Keperawatan*, 3(3), 9.
- Tallier, P. C., Reineke, P. R., Asadoorian, K., Choonoo, J. G., Campo, M., & Malmgreen-Wallen, C. (2017). Perioperative registered nurses knowledge, attitudes, behaviors, and barriers regarding pressure ulcer prevention in perioperative patients. *Applied Nursing Research*, 36, 106-110.
- Tuffaha, H. W., Roberts, S., Chaboyer, W., Gordon, L. G., & Scuffham, P. A. (2016). Cost-effectiveness analysis of nutritional support for the prevention of pressure ulcers in high-risk hospitalized patients. *Advances in Skin & Wound Care*, 29(6), 261-267.
- Utomo, W., Dewi, Y. I., & Abdurrasyid, T. (2014). Efektifitas nigella sativa oil untuk mencegah terjadinya ulkus dekubitus pada pasien tirah baring lama [Effectiveness of nigella sativa oil to prevent decubitus ulcers in bedrest patients]. *Jurnal Ners Indonesia*, 2(2), 151-157.
- van Nie-Visser, N. C., Schols, J. M., Meesterberends, E., Lohrmann, C., Meijers, J. M., & Halfens, R. J. (2013). An international prevalence measurement of care problems: study protocol. *Journal of Advanced Nursing*, 69(9), e18-e29.

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