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RESEARCH ARTICLE

DETERMINING THE RISK OF INTRAOPERATIVE PRESSURE INJURY IN PATIENTS UNDERGOING ELECTIVE CRANIAL SURGERY

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ABSTRACT

Purpose: Neurosurgical interventions are long and complex, and additional difficulties are encountered in positioning in the operating room.The aim of the study is to determine the risk of pressure injury development in the intraoperative period of patients undergoing elective cranial surgery.
Material and Methods: This descriptive cross-sectional study was conducted with 127 patients who met the inclusion criteria and underwent elective cranial surgery in a city hospital between September and October 2021. 3S Operating Room Pressure Injury Risk Diagnostic Scale were used to collect data.
Results: It was determined that 55.1% of the patients were female, their mean age was 53.22±13.47 years, and 61.4% had at least one chronic disease. It was determined that 71.7% of the patients were operated with the diagnosis of cerebellar tumor. Stage 1 pressure injuries were observed in 37% of the patients. It was determined that the total score obtained from the scale was 14.87±2.83 and the patients were at low risk for pressure injury. Age, body mass index and duration of the surgical procedure were found to be independent factors affecting the patients' operating room pressure injuries risk assessment scale score.
Conclusion: It was determined that the risk of pressure injury in patients who underwent cranial surgery was low level.

Keywords: Pressure injury, intraoperative period, neurosurgery, nursing care

INTRODUCTION

A pressure injury is defined as localized skin and / or subcutaneous tissue damage caused by pressure alone or a combination of pressure with rupture, usually occurring on bone prominences (1). Despite the developments and innovations in the field of health, pressure injuries are an important problem in terms of patient safety (2). In the literature, it is stated that there are various incidence rates of perioperative pressure injuries. A systematic review of 17 studies published from 2005 to 2011 evaluating the incidence of pressure injuries showed results ranging from 0.3%

to 57.4% (3). It has been reported that the incidence of pressure injuries in hospitalized patients varies between 2% and 13% (4).

Pressure injuries in the intraoperative period increase the risk of musculoskeletal pain, skin and nerve injuries, disease risk, delay recovery, prolong hospital stay, and negatively affect individuals and their families physically and emotionally (6,7). A study conducted showed that 12.2% of 172 patients were affected by injuries related to the operating position, 9.9% complained of severe pain, 4.7% had peripheral nerve injuries (8).

The most critical way to prevent pressure injuries is to determine the risk factors that can cause the formation of pressure injuries (9). All professionals involved in the anesthesia and surgery team, especially nurses, play an important role in the prevention of pressure injuries. In this context, nurses should be aware of the anatomical and physiological changes caused by the surgical position, existing equipment and devices in the patient's body by ensuring the planning and implementation of interventions to prevent complications that will occur due to prolonged stay of the patient in any type of surgical position during the perioperative period (7).

Neurosurgical interventions face additional challenges related to positioning in the operating room, as they are long and complex procedures. Neurosurgical nurses are responsible for the safety of their patients during the perioperative period and have important responsibilities for providing safe positions (10). In terms of pressure injury development, considering the risks such as the positions given during cranial surgery and the long duration of surgery, it is thought that this research will guide the planning and implementation of appropriate interventions to reduce the risk of pressure injury development in patients undergoing cranial surgery.

Research Questions

1. What is the risk of pressure injury in the intraoperative period of patients undergoing elective cranial surgery?
2. Are there any effects of socio-demographic and surgical process characteristics on the risk of pressure injury in the intraoperative period?

MATERIAL AND METHODS

Before starting the study, ethics committee (No: 2021.08.158) and institutional permission were obtained from the Clinical Research Ethics Committee (Ethics Committee of Clinical Research of Başakşehir Çam and Sakura City Hospital) on 15/08/2021. In addition, written and verbal informed consent was obtained from the patients who agreed to participate in the study.

The research was conducted in neurosurgery operating rooms of a city hospital between September 1 and October 15, 2021. The population of the study consisted of patients who underwent elective cranial surgery in the neurosurgery operating rooms of a Training and Research Hospital and a city hospital between September 1 and October 15, 2021. For the sample, it was planned to reach 127 patients as a result of the calculation made with a margin of error of ±5 and the power of the research to be 95%. The sample of the study consisted of 18-year-old and older volunteers, who planned elective cranial surgery under general anesthesia, no hearing, speech and mental problems, no pressure injuries before admission to the operating room, no systemic infection such as sepsis, pneumonia, blood infections or intracranial infection and local infection such as meningitis, abscess and patients without neural deficits were included.

Data Collection Tools

Introductory Features Information Form: It consists of seven questions containing the socio-demographic characteristics of the participants such as age, gender, smoking, as well as clinical characteristics such as chronic disease, type of anesthesia, surgery performed.

3S Operating Room Pressure Injury Risk Diagnostic Scale: The scale was developed by Gao et al. (2015). Turkish validity and reliability was done by Soyer and Özbayır (2018). The scale is based on the risk factors of pressure injury of patients undergoing surgery, such as skin condition in the whole body, activity status, height /weight ratio, amount of bleeding in surgery, body temperature, stress condition of the skin, duration of surgery, position of surgery, etc. The items of the scale range from one to four points. Scores from the scale without a cut-off point range from 9 to 36. As the score obtained from the scale increases, the risk of pressure injury increases (Soyer and Özbayır, 2018). The Cronbach α value of the original scale was 0.71 (Gao et al., 2015); Cronbach's α d value was 0.68 in the Turkish validity and reliability study (Soyer and Özbayır, 2018). For this study, the Cronbach α value was found to be =0.65.

Table 1. Patient identifier features (N=127)

Features	Category	n	%	Mean ±SD	Median (Min.-Max.)
Age		127	100.0	53.22±13.47	53 (18-79)
Age (years)	<40	20	15.7		
	40-60	66	52.0		
	>60	41	32.3		
Gender	Female	70	55.1		
	Male	57	44.9		
BMI	Normal	49	38.6		
	Fat	53	41.7		
	Obese	25	19.7		
Glasgow Coma Score (GCS)	Oriented	121	95.3		
	Confusion	6	4.7		
Smoking	Yes	46	36.2		
	No	81	63.8		
Preop hospital stay (days)		127	100.0	5.16 ±3.62	4 (1-22)
Diagnosis	Cerebellar tumor	91	71.7		
	Subarachnoid hemorrhage	19	15.0		
	Hemifacial spasm/epilepsy	15	11.8		
	Arnold Chiari	1	0.8		
	Cranial defect	1	0.8		
Presence of a chronic disease	Yes	78	61.4		
	No	49	38.6		
Chronic disease type	DM	27	21.3		
	HT	37	29.1		
	Cardiovascular	7	5.5		
	Other	38	29.9		
The presence of a constantly used drug	Yes	58	45.7		
	No	69	54.3		
Drugs used	Heart medicine	4	3.1		
	Anticoagulant	3	2.4		
	Antihypertensive drug	37	29.1		
	Diabetes medicine	27	21.3		
	Cholesterol medicine	2	1.6		
	Thyroid medication	5	3.9		
	Asthma-Chronic Obstructive Lung Disease medication	5	3.9		
	Antiepileptic drug	8	6.3		
Type of surgery	Tumor excision by craniotomy	88	69.3		
	Aneurysm clipping	22	17.3		
	Microvascular decompression	17	13.4		

SD=Standard deviation

Data Collection

Patients were checked for the presence of pressure injuries after admission to the operating room. Descriptive characteristics information form and socio-demographic and clinical characteristics information were collected from the patients who met the inclusion criteria, while the risk assessment of the patients was performed at the end of the operation with the 3S Operating Room Pressure Injury Risk Diagnostic Scale.

Table 2. Patient surgical process characteristics (N=127)

Features	Category	N	%	Mean±SD	Median (Min.-Max.)
Type of surgery	Tumor excision by craniotomy	88	69.3		
	Aneurysm clipping	22	17.3		
	Microvascular decompression	17	13.4		
Preoperative fasting time (min)		127	100.0	616.73±118.57	600(480-960)
Preoperative body temperature (C^0)		127	100.0	36.4 C^0 ±0.3	36.4C^0(36-37.4)
Operating room temperature (C^0)		127	100.0	20.2 C^0 ±1.3	20.1 C^0(18-24)
Use of heater during surgery	Yes	83	65.4		
	No	44	34.6		
Heater exposure time (min)		127	100.0	288.62±151.91	270(40-670)
Type of heater (n=83)	Blankets	71	85.5		
	Dry air blower	12	14.5		
Duration of surgery (min)		127	100.0	330.98±145.53	300(90-840)
Blood transfusion status	Yes	11	8.7		
	No	116	91.3		
Post-operative pressure sore stage	No pressure injury developed.	78	61.4		
	Deep (suspicious) tissue injury	1	0.8		
	Stage-I	47	37		
	Stage-II	1	0.8		

SD=Standard deviation

Statistical Analysis

While evaluating the findings obtained in the study, SPSS (Statistical Package for the Social Sciences) version 25.0 (IBM Corp., Armonk, NY, USA) program was used. Kolmogorov-Smirnov test was used to test the normality of the scores obtained from a continuous variable by statistical method. In addition, Levene's test was used for homogeneity of variances. In addition to descriptive statistical methods (number, percentage, mean, median, standard deviation, etc.) in the evaluation of the data, One-way ANOVA analysis and Independent samples t test were used to test the difference between groups. Multiple comparisons were performed with the Tukey test in groups where the difference was significant as a result of ANOVA analysis. In addition, multiple linear regression analysis was used to determine the effect of independent factors on the dependent variable. The results were evaluated at the 95% confidence interval and the significance level was $p<0.05$.

RESULTS

The mean age of the patients was 53.22 (13.47), 55.1% (n=70) were female, 41.7% (n=53) were overweight; It was observed that 63.8% (n=81) were non-smokers, 61.4% (n=78) had chronic disease, and 54.32% (n=69) were not taking any medication regularly. It was found that the mean duration of hospitalization before the operation was 5.16 ±3.62 days, and 95.3% (n=121) of the patients were oriented according to the Glasgow coma scale. When the diagnosis distributions were examined, it was determined that 71.7% (n= 91) of them were hospitalized with the diagnosis of cerebellar YKL and 69.3% (n= 88) of them underwent tumor excision with craniotomy (Table 1).

Considering the surgical process characteristics of the patients; mean preoperative fasting time was 616.73±118.57 minutes, mean preoperative body temperature was 36.4°C ±0.3, mean operating room temperature was 20.2°C ±1.3, heater exposure time mean was 288.62±151 91, and the mean operation time was 330.98±145.53 minutes. It was determined that 65.4% (n=83) of the patients used heaters during the operation, 85.5% (n=71) used blankets as heaters, 91.3% (n= 116) did not receive blood transfusions, and 37% (n= 47) of the patients developed stage 1 pressure injuries (Table 2).

Table 3. Intraoperative risk assessment scale of pressure sore results

3S Intraoperative Risk Assessment Scale of Pressure Sore	**Mean (SD)** 14.70 ±2.83		**Median (Min.-Max.)** 14 (10-24)	
	Good	**Mild edema**	**Medium edema**	**Serious edema**
Skin of whole body	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	114(89.8)	10(7.9)	2(1.6)	1(0.8)
Cases with pressure sores (n=49)	40(81.6)	6(12.2)	2(4.1)	1(2)
	No limitation	**Slight limitation**	**Partial limitation**	**Complete limitation**
Pre-operation limb activity	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	101(79.5)	17(13.4)	9(7.1)	0(0)
Cases with pressure sores (n=49)	37(75.5)	9(18.4)	3(6.1)	0(0)
	Standard	**Slight obesity/ emaciation**	**Obesity/ emaciation**	**Excessive obesity/ emaciation**
Body height-weight ratio	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	51(40.2)	44(34.6)	25(19.7)	7(5.5)
Cases with pressure sores (n=49)	11(22.4)	16(32.7)	16(32.7)	16(32.7)
	Good	**Red spot and dampness**	**Ecchymosis and blister**	**Damaged skin**
Skin under stres	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	125(98.4)	2(1.6)	0(0)	0(0)
Cases with pressure sores (n=49)	47(95.9)	2(4.1)	0(0)	0(0)
	<200ml	**200-400ml**	**400-800ml**	**>800ml**
Intraoperative bleeding	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	51(40.2)	59(46.5)	13(10.2)	4(3.1)
Cases with pressure sores (n=49)	10(20.4)	25(51)	10(20.4)	4(8.2)
	No stress	**Slight stres**	**Medium stres**	**Serious stres**
Intraoperative stress	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	80(63)	29(22.8)	17(13.4)	1(0.8)
Cases with pressure sores (n=49)	21(42.9)	13(26.5)	14(28.6)	1(2)
	36.1-37.2	**37.2-37.7**	**37.7-38.3**	**>38.3 or <36.1**
Intraoperative body temperature (°C)	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	104(81.9)	3(2.4)	0(0)	20(15.7)
Cases with pressure sores (n=49)	30(61.2)	3(6.1)	0()	16(32.7)
	Supine	**Lateral**	**Lithotomy**	**Prone**
Intraoperative body position	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	91(71.7)	22(17.3)	0(0)	14(11)
Cases with pressure sores (n=49)	33(67.3)	10(20.4)	0(0)	6(12.2)
	<1h	**1-3h**	**3-5h**	**>5h**
Operating time (hour)	**n(%)**	**n(%)**	**n(%)**	**n(%)**
All cases (n=127)	1(0.8)	19(15)	53(41.7)	54(42.5)
Cases with pressure sores (n=49)	0(0)	4(8.2)	12(24.5)	33(67.3)

The results of the operating room pressure injury risk assessment were given in Table 3. It was determined that the mean score of the patients on the operating room pressure injury risk assessment scale was 14.70±2.83 and the median value was 14 (10-24) points.

In Table 4, the factors affecting the scores of the operating room pressure injury risk assessment scale of the patients were examined. By using factors that are significant in univariate analyzes and meet multiple regression modeling assumptions; Multivariate linear regression analysis established by the enter method was applied to determine the conditions affecting the patients' operating room pressure injury risk assessment scale scores. As a result of the analysis, it was found that a significant regression model, F=20.069, p=<0.001 and 45% of the variance in the dependent variable (R2=0.453) were explained by independent variables. Accordingly, it was determined that age (β=0.26, p=<0.001), BMI (β=0.36, p=<0.001) and duration of surgery (β=0.48, p=<0.001) were independent factors affecting the scores of the operating room pressure injury risk assessment scale of patients.

Table 4. Independent factors associated with the intraoperative risk assessment scale of pressure score

Factors	***Unstandardized Coefficients***		***Standardized Coefficients***	***T***	***p***	***Model***
	B	**SE.**	**Beta(*β*)**			
Age	0.055	0.015	0.260	3.597	**<0.001***	***R^2=0.453***
BMI	0.232	0.044	0.363	5.227	**<0.001***	***Adjusted R^2=0.431***
Presence of a chronic disease *(No=0; Yes=1)*	0.345	0.551	0.060	0.625	0.533	***F=20.069***
The presence of a constantly used drug *(No=0; Yes=1)*	0.536	0.538	0.095	0.997	0.321	***p=<0.001***
Duration of surgery (min)	0.009	0.001	0.478	6.949	**<0.001***	

*p<0.05, Linear Regression(Method=Enter)

Table 5. Pressure injury development area

Area	**Category**	**n (%)**
Scapula	All cases (n=127)	18(14.2)
	Cases with pressure sores (n=49)	18(36.7)
Sacrum	All cases (n=127)	11(8.7)
	Cases with pressure sores (n=49)	11(22.4)
Lower back/gluteal area	All cases (n=127)	11(8.7)
	Cases with pressure sores (n=49)	11(22.4)
Gluteal area	All cases (n=127)	2(1.6)
	Cases with pressure sores (n=49)	2(4.1)
Knees	All cases (n=127)	1(0.8)
	Cases with pressure sores (n=49)	1(2.0)
Trochanters	All cases (n=127)	4(3.1)
	Cases with pressure sores (n=49)	4(8.2)
Side of the costa	All cases (n=127)	8(6.3)
	Cases with pressure sores (n=49)	8(16.3)
Chest area	All cases (n=127)	7(5.5)
	Cases with pressure sores (n=49)	7(14.3)
Shoulder heads	All cases (n=127)	0(0.0)
	Cases with pressure sores (n=49)	0(0.0)
Femur lateral	All cases (n=127)	4(3.1)
	Cases with pressure sores (n=49)	4(8.2)
Heels	All cases (n=127)	0(0.0)
	Cases with pressure sores (n=49)	0(0.0)

When the pressure injury development regions were examined in the cases that developed pressure injuries, it was seen that pressure injuries developed most in the scapula (36.7%), sacrum (22.4%) and lower back/gluteal (22.4%) regions (Table 5).

DISCUSSION

Surgical patients are at risk for pressure injuries during the perioperative process. In the literature, it is stated that the incidence of pressure injury is higher in cardiac, vascular, spinal and head and neck units (13). The etiology of pressure injuries, which can be grouped into internal and external factors that can occur during surgery, is associated with various risk factors. Inherent factors in the development of pressure injuries in surgical patients are chronic diseases, age, nutritional status, neuropathies, anemia, etc. In addition, external factors such as surgery time, patient staying in the same position for a long time, blood loss, type of anesthesia, tools used

in surgery, use of vasopressors in surgery, hypothermia, patients' exposure to friction and slippage during transfer play an important role. The greater the intensity of these factors, the higher the risk of developing pressure injuries (2,13-15). In this context, the most important step in preventing the formation of pressure injury is risk assessment. The development of pressure injuries can be prevented by planning and monitoring individual-specific care using a valid and reliable tool suitable for the patient group (4).

A good prevention and care of stress skin injuries is one of the difficult and urgent problems for nurses in the operating room, and is also an important indicator for assessing the quality of nursing in the operating room (16). Meehan et al. (2016) reported that pressure injuries were reduced by 60% in surgical patients with risk assessment and perioperative protective measures (17). In this study, patients undergoing elective cranial surgery were evaluated using the intraoperative 3S Operating Room Pressure Injury Risk Diagnosis Scale. In the study of Şahin and Başak (2020), in which they evaluated the risk of intraoperative pressure injury in orthopedic patients, the risk was determined to be moderate (6). Considering that all patients are at risk in operating rooms, it was found that the risk of pressure injury was low in this study, unlike the study of Şahin and Başak.

In the literature, it is stated that one of the most common complications in surgical patients is the development of stage I and II pressure injuries during surgery. Pressure injuries can be observed immediately after surgery and can progress rapidly to stages III and IV (14,15). In Schoonhoven's (2002) study, it was stated that 21.2% of the patients developed pressure injuries within two days after surgery (18). According to Scarlatti et al. (2011) found that the incidence of pressure injuries development in surgical patients was 20.6% and that 98.6% of pressure injuries developing were stages I and II (15). According to Bulfone et al. (2012) in their study, it was stated that 12.7% of the patients developed pressure injuries in the operating room and 46.1% of these injuries continued on the third day after surgery (19). According to Furuno et al. (2014) in their retrospective study of methods for preventing positioning-related complications associated with the lateral suboccipital approach, it was observed that Stage I 22% and II (12%) pressure injuries developed. In this study, it was also seen that 37% of the patients developed Stage 1 pressure injuries at the end of surgery (20).

Perioperative complications increase with age. In the intraoperative period, the advanced age of the patients, the changes in the level of consciousness and the presence of concomitant diseases increase the risk of pressure injury development (2). In the literature, it is stated that the elderly are the group at higher risk because their skin undergoes an aging-specific physiological process that makes the skin more sensitive by reducing the elasticity and texture of the skin, muscle mass, inflammatory response, albumin levels and subcutaneous tissue (2). Saraiva et al. (2014) found that advancing age was positively associated with perioperative pressure injury formation, and the incidence of pressure injuries was high (40.0%) in patients aged 65 and over (21). According to Pexioto et al. (2019) showed that elderly patients do not have a higher risk of developing perioperative pressure injuries than adults (2). In this study, it was found that there was a significant difference between age and pressure injury development, and the risk of pressure injury development was higher over the age of 60.

Although the duration of surgery is an important risk factor for the development of pressure injuries, this risk increases even more as the duration of surgery increases. Most patients can tolerate pressure for a short time. However, if the pressure persists for a long time, tissue hypoperfusion, ischemia, and necrosis may occur (10). According to Haisley et al. (2020) in the study in which they evaluated pressure injuries after surgery in patients undergoing general anesthesia, they determined that the risk factors for developing pressure injuries are cardiovascular disease, respiratory disease, diabetes mellitus, anemia, and the duration of surgery (22). Schoonhoven et al. (2002) in their study to determine the incidence of pressure injuries caused by surgery, they found that 21.2% of patients who stayed in surgery for more than 4 hours developed pressure injuries in the first 2 days (18). Primiano et al. (2011) reported that the prevalence of pressure injury in surgeries lasting longer than 3 hours is 8.5%, and one of the risk factors for the intraoperative period of surgery is that the operation lasts more than 4 hours (5). In this study, similar to the literature, the average duration of surgery was 5.5 hours and there was an independent risk factor for the development of pressure injuries.

In the literature, it is reported that overweight and low weight increase the risk of perioperative pressure injury formation (23). The risk of high pressure injuries caused by static friction forces increases even more if the surgical patient is overweight or obese (24). Obesity is considered a risk factor for the formation of perioperative pressure injuries due to the fact that more fat mass compresses the blood vessels. However, low weight can lead to a significant exposure of the patient's bone protrusions, making these points more susceptible to the formation of pressure injuries (8). Regarding the nutritional status, a Menezes et al. (2017) confirmed that BMI is a risk factor for the development of perioperative pressure injuries. In the study, BMI>30 Kg/m2 was indicated as a preparatory factor for the formation of pressure injuries (8). Mishu et al. (2015) showed in their study that as the BMI index increases, the risk of pressure injury formation increases and the risk is lower in thin individuals (25). In this study, it was also found that the majority of patients were overweight and that the BMI index was an independent risk factor for pressure injury development.

About 80% of all pressure injuries occur in one of these four anatomical areas the sacrum, the ischium, the trochanter and the heel area. When the subcutaneous blood flow is disturbed, tissue anoxia may occur, which contributes to the development of pressure injuries. When the skin and subcutaneous layers are torn, muscle and tissue damage may occur (10,11). It is stated that the coccygeal/sacral region, hips, genital region and heels are at risk in patients who have undergone surgery (11). Schoonhoven et al. (2002) conducted a study on 208 patients in which pressure injuries developed in the heel and sacral areas (18); Ortak et al. (2003) in their study, pressure injuries appeared in the sacral, thoracic, ischial and heel areas (26); Demirel et al. In the study of (2007), it was found that it develops in the thoracic, ischial, sacral and heel regions (27). In this study, it was observed that pressure injuries developed in the scapula, sacrum and lower back/gluteal region.

Another important factor to consider in the context of preventing pressure injuries in the operating room is the surgical position. In the study of Engels et al. (2016), it was found that supine and prone positions are risky for the development of pressure sores (28). Furuno et al. (2014) determined that the park-bench position, which is often used in brain surgeries where access to the posterior fossa is required, has a relatively high risk of pressure sores (11%), especially if the operation lasts longer than 6 hours (20). In a study by Munro et al (2010), it was reported that the risk of intraoperative pressure injury development was higher in supine and prone positions (29). In this study, it was determined that the majority of patients who developed pressure sores were in supine, lateral and prone positions, similar to the study results of Munro et al. (2010).

CONCLUSION

All patients undergoing surgery are at risk of developing pressure injuries. Prevention of pressure injury is very important for patient safety in the perioperative environment. The risk and skin assessment of the surgical patient is the most important factor in preventing the development of pressure injuries, and a multidisciplinary team approach is required to assess the risk. The majority of the factors that can be determined by risk assessment can be prevented by nursing interventions. In this study, it was determined that the risk of pressure injury was low in patients who underwent elective cranial surgery, and age, BMI and duration of surgery were independent risk factors for pressure injury development.

In accordance with these results, nurses who are important members of the surgical team are recommended to ensure patient safety by conducting a pressure injury risk assessment with scales that have been proven to be valid and reliable, taking action against factors that cause a pressure injury protecting and maintaining tissue integrity. However, the use of the 3S operating room pressure injury risk diagnostics scale and studies with larger sample groups should be planned to determine the risk of pressure injury of patients in the operating room.

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