Associated Risk Factors of Pressure Ulcers among Hepatic Encephalopathy Patients

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Abstract

Background In critical care settings, pressure ulcers are a frequent and dangerous side effect among patients with hepatic encephalopathy. A number of characteristics associated with their underlying disease and the intensive care setting make these individuals especially susceptible to pressure ulcer development. **The Aim of the study:** Assess associated Risk Factors for Pressure Ulcers among hepatic encephalopathy patients. **Design**: Cross – sectional observational research design. **Setting:** The study was conducted at Intensive Care Unit of Al-Rajhy Hospital at Assuit University Hospital. **Sample:** Convenience sample of 300 critical ill patients **Tools: - Tool I:** Patient assessment tool. **Tool II :** Skin assessment sheet **The Results**: Results of current investigation illustrated that 71.3 % of studied patients were affected with friction and shear and 70.7% were completely immobiled . The majority of the studied patients 91.0% had nutritional deficits followed by 86.7% long term hospitalization. **Conclusion:** Associated risk factors for pressure ulcers among hepatic encephalopathy patients were immobility, friction and shear ,nutritional deficiencies .**Recommendations:** Provide education program for caregivers on the importance of skin care , nutrition, and repositioning.

Key words: Associated Risk factors – Hepatic encephalopathy – Pressure Ulcers.

Introduction

Hepatic encephalopathy (HE) is one of the most debilitating complications of cirrhosis and severely affects the lives of patients and their caregivers. It is characterized by reversible neurological impairments. Symptoms start with psychomotor changes and progress to confusion, disorientation and eventually coma. Hospitalizations occur frequently to manage these debilitating symptoms **(Cammarota etal., 2021)**

The presence of serious HE in cirrhotic patients was an indicator for management in the intensive care unit, with patients usually need tracheal intervention for airway safeguarding **(Dong & Karvellas.,2019)**

Hospital-acquired pressure injuries are an emerging patient safety problem in critical care settings, and they are often recognized as the most preventive adverse events while nurse standards of care comply with (**Isfahani et al.,2024)**

The National Pressure Injury Advisory Panel (NPIAP) defines PU as limited damage to the skin and/or below soft tissues, usually found over a bony prominence, or triggered by the use of a medical device or another object, and taking place as a result of intense and/or prolonged pressure or from contact with shear. Furthermore, it is recognized that environment, nutrition, perfusion, concomitant disorders, and the status of one's own soft tissues all influence the development of PU (**National Pressure Injury Advisory Panel .,2019)**

Pressure ulcers can be induced by both intrinsic (age, nutritional status, chronic diseases, lack of activity, the length of stay in the ICU, immune system, treatment with radiation, and mental and psychological state) and extrinsic (the pressure, friction, period of pressure/friction, skin scratching tension, temperature, humidity, trauma, the swelling, infection, quality of nursing care, patient shifting position, bed position, and socioeconomic status) (**Coyer, Tayyib, 2017)**

The frequency of pressure ulcers in intensive care units (ICU) is much higher than in noncritical care environments. ICU patients are the most sensitive group to disruptions in skin integrity. **(Digesa et al ,2023).** Recognizing the risk factors for pressure ulcers is an important step in preventing their spread. However, there still exists no consensus on these issues. **(Borojeny et al ,2020)**

Patients who are at risk should take preventative steps since pressure ulcers can have negative effects on their physical, emotional, social, and financial well-being. Workshops and ongoing training programs for hospital staff, along with patient and family education, are crucial to lowering the incidence of pressure ulcers in healthcare facilities. (**Isfahani et al ,2024)**

The occurrence of PU can be reduced by nurses who are aware of worldwide guidelines for its prevention and who employ screening methods to find patients who are at risk. Even though using screening techniques like Norton, Braden, and Waterlow to identify patients at risk of PU can mostly prevent the development of PU, they are now infrequently used in general and critical care wards. Therefore, it is advised that adequate training be given to deal with this problem**.(Akhkand et al., 2020).**

A risk assessment, support surfaces, patient moving position, mobilization, friction removal, nutritional support, and moisture control are all included in the care bundles. Additional possibilities for intervention include staff training, automated systems, standardized medical procedures, health record evaluation, audit result feedback, and unit-based wound care providers**.(Floyd et al, 2021).**

Significance of the study

According to numerous research, pressure ulcers were much more common in ICU patients than in non-ICU settings (**Strazzieri-Pulido et al,2019)**

Four out of five (80%) of the research patients who had incident cases of pressure ulcers had them within six days after being admitted to the intensive care units. **(Digesa et al ,2023)**

After cardiovascular disease and cancer, pressure ulcers are currently the third most expensive illness. With 60,000 fatalities annually attributed to this consequence, the incidence of death from this condition is two to six times higher than that of other illnesses (**Borojeny et al ,2020)**

Aim of the study

Assess associated risk factors for pressure ulcers among hepatic encephalopathy patients.

Research question

What are the associated risk factors for pressure ulcers among hepatic encephalopathy patients**?**

Research design

For this study, a cross-sectional observational research design was employed. In reality, cross-sectional studies are observational studies that assess population data at a certain moment in time. These instruments are frequently used to characterize demographic traits, identify health determinants, and evaluate health outcomes. They are crucial for obtaining preliminary data in order to plan for upcoming, more in-depth research. **(Wang,Cheng, 2020).**

Setting

The study was conducted at Al-Rajhy Intensive Care Unit .

Sample

Adult males and females hepatic encephalopathy patients who recently admitted to intensive care unit with ages ranging from 18 to less than or equal to 65 years old were constituted the sample through six months . There were 300 patients**.**

Inclusion criteria

- Age>18 years old.
- Newly admitted male and female patient to ICU with hepatic encephalopathy.

Exclusion criteria:

- Patient with any malignancies

Data Collection Tools

Two tools were developed by the researcher based on reviewing of the relevant national and international literature and used to collect data pertinent to the study.

Tool I: Patient assessment tool:

It assessed the studied patients regarding the demographic data and medical related data as baseline data

- **Part I**: **Personal and Clinical data of the patient:** it covered the following areas: Patient's code, age, gender, past medical history, date of admission**,** marital status**.**
- **Part II : West Haven classification system:** It was adopted from **(Conn, 1993)** and based on **(Thornburg, 2023**).The West Haven classification system is most commonly used to grade the severity of hepatic encephalopathy . The West Haven criteria used to categorizes the severity of overt hepatic encephalopathy; it grades the severity of the hepatic encephalopathy based on a clinical assessment, with a score ranging from grade 0 (no abnormalities) to grade 4 (coma).

Tool II: **Skin assessment sheet:** It assessed the studied patients regarding Braden scale and Risk Factors of pressure ulcer.

- **Part I: The Braden scale :**The Braden scale was adopted from **(Braden and Bergstrom., 1984)** and based on **(Digesa et al., 2023) , (Nóbrega et al., 2023),** it assessed the risk of developing pressure ulcer. This scale divided into six types: sensory perception, activity, mobility, nutrition, moisture, and friction \ shear. Potential score range from 6 to 23; lower scores indicate greater risk. Score of 15 to 18 indicate no risk or mild

risk; scores of 9 or less, very high risk. Stratification of risk for pressure ulcers can be useful clinically for determining and implementing the appropriate level of prevention.

- **Part II**: **Risk Factors of pressure ulcer :**After examining pertinent literature, the researcher developed this tool. (**Beder et al , 2023) (Digesa et al ,2023)** it consisted of (Incontinence of urine or stool-Nutritional deficit- History of Diabetes mellitus- History of vascular disease- History of hypertension – Hypoalbuminemia- Altered level of consciousness- Patients on mechanical ventilation- Long – term hospitalizations- Male sex- Age more than 60 years and Coma- ARDS- Old Age- Patient suffered from melena)

Methods

1. The study began in September 2023, with a literature review, study idea, and tool construction lasting until October.
2. The researcher created the study tool based on relevant national and international literature.

Content validity

Content validity was done by five specialists (three critical care nursing specialist and two critical care medicen specialist)who evaluated the tools for clarity, relevance, comprehensiveness, and understanding.

Pilot study

The pilot study included 10% of the studied sample (30 patients) they were used to determine the tools' applicability and clarity as well to estimate time needed to fill in the data collection tools. The data from the pilot study were analyzed; no changes were made to the tools utilized, the pilot study were not enrolled in the main research study.

Reliability

Reliability of Braden Scale and Risk Factors of pressure ulcer tool was assessed in a pilot study by measuring their internal consistency using Cronbach's alpha coefficient method (0.732).

Ethical considerations

- Research approval will be approved from ethical committee in the faculty of nursing.
- There was no risk for study subject during application of the study.
- The study will follow common ethical principles in clinical research.
- Confidentiality will be assured.
- Study subject privacy will be considered during collection of data.
- Explanation of the aim and nature of the study was done to studied patients. They had the right to refuse participation in the study.
- Written consent was obtained from patients who were participated in the study.

Data collection phase

- Data were gathered over the course of six months, from October 2023 to March 2024.
- Patient's assessment data were collected from the first day of patient admission to ICU until discharge.
- The researcher introduced herself to all patients or relatives and explains the purpose and importance of the study so the approval for participation was secured from them.
- All participants were assessed at admission using Tool I. Tool I was utilized to evaluate Personal and Clinical data of the patient, west haven classification system
- Tool II: It was used to assess Braden scale and patient's risk factors of pressure ulcers .
- Braden scale was used to assess the risk of developing pressure ulcer which consist of (Sensory perception, Moisture, Activity, Mobility, Nutrition, Friction and Shear).

Administrative design

The director of Al-Rajhy hospital and the supervisor of the intensive care unit received an official permission from the dean of the Faculty of Nursing at Assuit University, outlining the goals of the study and requesting their consent to collect data from the study group. The researcher met with patients or their relative and held discussions to describe the purpose, scope, and goals of the study.

Statistical analysis

The researcher submitted the data through a personal computer. All data underwent analysis using the Statistical Package for the Social Sciences (SPSS) version 26.0 software, and Excel was employed to generate the figures. The researcher examined, classified, and coded the content of each tool. Categorical variables were presented as numbers and percentages, while continuous variables were described using the mean and standard deviation (Mean, SD).

Results

Table (1) illustrates the distribution of the patients under study based on their individual traits. The average age was 60.9 ±7.7, and over half of the patients in the study were married (67.7%) and male (59.66%). In contrast to diabetes and hypertension, over half of the participants in the study had a history of other illnesses (54.7%).

Figure (1) shows the distribution of the patients under study in according to the West Haven classification system. 47.0% of patients were found to be in stage 4 when they were admitted.

Figure (2) shows the distribution of the patients under study in relation to the Braden scale categories. It was shown that 55% of the patients fell into the group of very high risk.

Table (2) shows the distribution of the patients under study with respect to the risk assessment for Braden pressure ulcers. It was shown that the majority of patients (71.3%) had friction and shear issues, followed by those who were bedridden (70.7%) and completely immobile (71.3%).

Table (3) represents the distribution of the patients under study in terms of pressure ulcer risk variables. "Nutritional deficits" accounted for the largest percentage (91%) followed by long-term hospitalizations (86.66%) and hypoalbuminemia (85.3%).

Results

Table (1): Distribution of the studied patients according to their personal characteristics (N=300)

Characteristics of patients (N=300)		No.	%
Gender	Male	179	**59.66**
	Female	121	40.3
Past medical history	Diabetes	66	22.0
	Hypertension	21	7.0
	Other	164	**54.7**
	DM + HTN	41	13.7
	DM + other	3	1.0
	HTN + other	5	1.7
Marital status	Single	5	1.7
	Married	203	**67.7**
	Widow	٣٦	١٢
	Divorced	٥٤	١٨.6
Age		(M&SD) **60.9 ±7.7**	

Figure (1): Distribution of the studied patients according West Haven classification system (N=300)

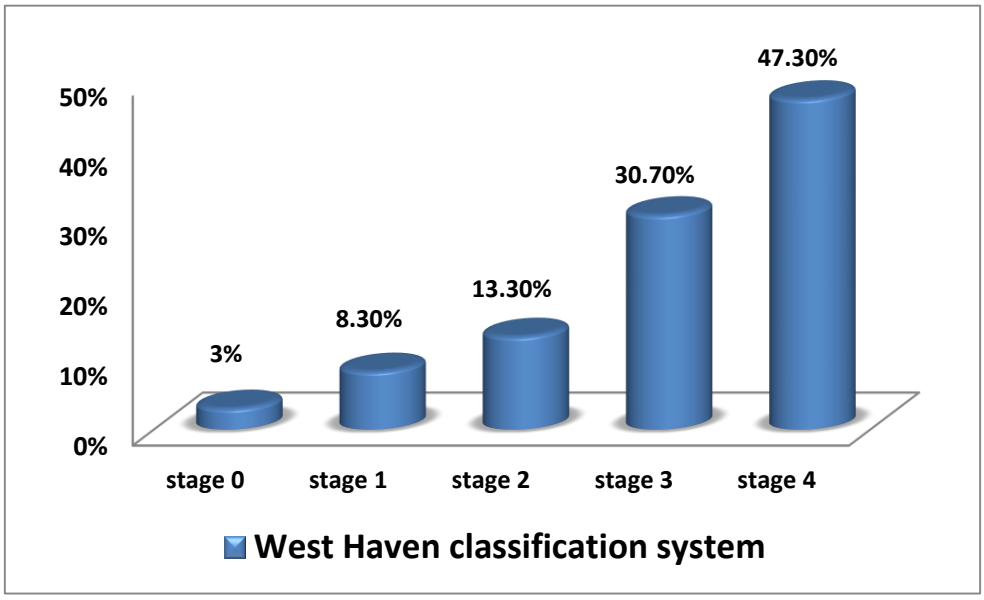
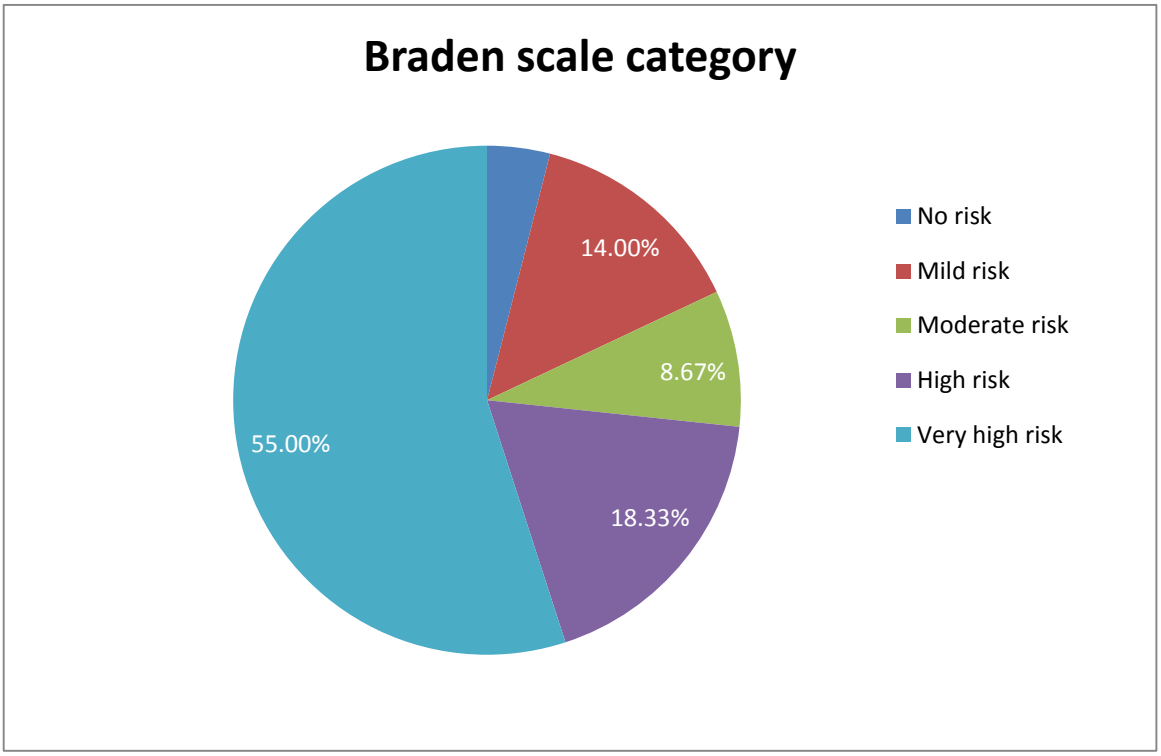


Figure (2): Distribution of the studied patients according to Braden scale categories. (N=300)



Part II: Table (2) Distribution of the studied patients regarding Braden pressure ulcer risk assessment (N=300)

Braden pressure ulcer risk assessment:		No.	%
Sensory perception	Completely limited	158	52.7
	Very limited	73	24.3
	Slightly limited	47	15.7
	No impairment	22	7.3
Moisture	Completely moist	151	50.3
	Very moist	70	23.3
	Occasionaly moist	53	17.7
	Rarely moist	26	8.7
Activity	Bedfast	212	70.7
	Chair fast	65	21.7
	Walks occasionally	18	6.0
	Walks frequently	5	1.7
Mobility	Complete immobility	212	**70.7**
	Very limited	63	21
	Slightly limited	20	6.6
	No impairment	5	1.6
Nutrition	Very poor	151	50.3
	Probably inadequate	33	11.0
	Adequate	111	37.0
	Excellent	5	1.7
Friction and shear	Problem	214	**71.3**
	potential problem	55	18.3
	No apparent problem	31	10.3

Table (3) Distribution of patients' risk factors for pressure ulcer (N=300)

Risk Factors for pressure ulcer	No.	%
Incontinence of urine or stool	182	60.7
Nutritional deficits	273	**91.0**
History of Diabetes mellitus	66	22.0
History of vascular disease.	20	6.7
History of hypertension	21	7.0
Hypoalbuminemia	256	**٨٥.3**
Altered level of consciousness	١٧١	57
Patients on mechanical ventilation	236	78.6
Long – term hospitalizations	260	**86.6**
Male sex	170	56.6
Age more than 60 years and Coma	131	43.7
ARDS	106	35.3
Old Age	١٨٠	60
Patient suffered from melena	151	50.3

Discussion

Pressure ulcers are a worldwide issue that impacts patients in hospitals as well as those in the community. In addition to having a detrimental effect on patients and their families, it also costs healthcare organizations money. Longer stays in the critical care unit and increased mortality rates are linked to pressure ulcers. The quality of life is affected by pressure ulcers on an emotional, mental, physical, and social level.(**Mohamed et al .,2024)**

Intensive care units (ICUs) frequently admit patients with de-compensated cirrhosis (DC) due to serious side effects include hepatic encephalopathy (HE), acute kidney Injury (AKI), and gastrointestinal bleeding (GIB). **(Seshadri etal., 2022)**

The current investigation confirmed that the mean age of the patients was 60.9 ±7.7 and that over half of the patients were male. In support of this observation, **Tapper et al. (2019)** conducted a study titled "Incidence of and Risk Factors for Hepatic Encephalopathy in a Population-Based Cohort of Americans with Cirrhosis," which revealed that over half of the patients in the study were male. Additionally, they concurred with **Amini et al. (2022)** who conducted a study titled "Factors affecting the incidence and prevalence of pressure ulcers in COVID-19 patients admitted with a Braden scale below 14 in the intensive care unit: Retrospective cohort study," which found that the average age of the patients was 63 years.

In addition , This was also supported by **Beder et al. (2023),** who found that most of the patients were men in their study, "Risk Factors for Pressure Ulcer Development in Medical Intensive Care Units: an Observational Study".

Moreover, this was lined with **(Ahmed et al ., 2013)** who studied (The effect of nursing guidelines for preventing pressure ulcer in intensive care units on patient's outcomes) and found that most of the studied population were male.

The current study confirmed that over half of the patients were married. This finding is corroborated by a study conducted by **Afework et al. (2023)** that examined the status and factors influencing patient safety culture at Dilla University Teaching Hospital: A Mixed-Method Cross-Sectional Study and found that over half of the study participants were married.

In contrast to **(Mobayen et al., 2021),** who investigated the prevalence of bed sores among patients referring to a medical center in Iran and found that half of patients had hypertension and more than two thirds had diabetes, the current study confirmed that more than half of the patients had a past medical history with other diseases rather than diabetes and hypertension.

Regarding West Haven classification system, the majority of the patients in the current study were at stage four. **Denk et al. (2022)** observed that the majority of the patients were in stage two of their study, "Liver diseases as a novel risk factor for delirium in the ICU–Delirium and hepatic encephalopathy are two distinct entities."

According to the current study results, the majority of the patients were in stage four. This is related to the fact that the patients' mean age was 60.9 ±7.7 years, and the severity of the disease increases with age.

In terms of Braden scale categories, According to **Beder et al. (2023),** who looked into "Risk Factors for Pressure Ulcer Development in Medical Intensive Care Units," nearly three-quarters of the patients in the current study fell into the high-risk or very-high-risk

categories. They also found that high or very-high-risk scores on the first Braden Scale were statistically significant predictors of pressure ulcers.

The current research demonstrated that, more than two thirds of the investigated patients had problem of friction and shear, this was attributed to immobilization of patients. This was affirmed with **Qaddumi., 2019** who studied (A cross-sectional study of the prevalence of pressure ulcers and its risk factors among patients in the intensive care unit of Palestinian government hospitals) and observed that half of patients who developed PUs were suffered from friction, and friction were significant risk factors for PUs formation. **Also,** the results agreed with **Beder et al., 2023** who reported that friction is strong predictor for increased risk of PUs.

The study also examined other factors, such as the fact that over half of the patients are bedridden and completely immobile, which was linked to a decline in the patients' degree of consciousness. That was in line with the findings of **Amini et al.'s 2022** study, "Factors influencing the prevalence and incidence of pressure ulcers in COVID-19 patients recognized with a Braden scale below 14 in the intensive care unit: Retrospective cohort study," which found that the primary cause of PU development is a decline in mobility and activity-related Braden scores.

In addition, this was also agreed with **Abdelrahman et al., 2021** who investigated (Impact of Safety Skin Protocol on the Development of Pressure Ulcers in Patients with Immobility) and noted that Immobility, increase pressure, Immobilized patients more reliable to pressure ulcers**.**

Moreover , this was also agreed with **Mohammed et al., 2014** who studied (Risk factors of pressure ulcers among traumatized patients) and report that immobility was a risk factor of pressure ulcers.

In the context of risk factors of pressure ulcer, According to the current study, the largest percentage of cases were related to dietary deficiencies, which were ascribed to altered metabolism and poor protein synthesis. Hospital stay duration and hypoalbuminemia were the next most common causes. This was in line with the findings of **Han et al.'s 2020** study, "Prolonged stay in the emergency department is an independent risk factor for hospital-acquired pressure ulcer," which concluded that a hospital stay longer than 12 hours is a risk factor for the development of a pressure ulcer within a week of admission. This was corroborated by **Beder et al.'s 2023** study, "Risk Factors for Pressure Ulcer Development in Medical Intensive Care Units: an Observational Study," which found that the most prevalent risk factor among the pressure ulcer patients under investigation have hypoalbuminemia.

In addition, this was also agreed with(**Mohamed et al .,2024)** who studied (Risk factors assessment of Pressure ulcers among critically ill patient connected with mechanical ventilation) and report that hypoalbuminemia was a risk factor of pressure ulcers.

Furthermore, the findings concurred with those of **Langer et al.'s 2024** study on "nutritional therapies for the prevention and treatment of pressure ulcers", which pointed out that poor nutritional status is a risk factor in many risk assessment methods. It was also generally acknowledged that nutrition was a significant component.

While, this was also affirmed with **Sayan et al., 2020** who studied (The prevalence of pressure ulcers in hospitalized adult patients in Bursa, Turkey: A multicenter, point prevalence study) and observed that the incidence of PUs was related to length of hospital or ICU stay.

Furthermore, this was also agreed with(**Mohamed et al .,2024)** who studied (Risk factors assessment of Pressure ulcers among critically ill patient connected with mechanical ventilation) and found that Length hospital stay increase liability for developing pressure ulcers.

Additionally, this was also agreed with **Ciríaco et al., 2023** who studied (The impact of body mass index, nutrition therapy, and other non-nutritional factors on the incidence of pressure ulcers in critically ill patients) and found that patients with suspended diet, diabetics, with longer-time hospitalization have a increasing risk of presenting pressure ulcers.

Conclusion

This study found that immobility, friction and shear, and dietary deficits were the main risk variables linked to the development of pressure ulcers in patients with critical sick hepatic encephalopathy.

Recommendations

1. More participants should be included in future research, and findings should be extrapolated.
2. In critical care units, managing pressure ulcers should be a standard component of care for all critically ill patients.
3. To lower the risk of pressure ulcers, ICU patients must follow protocols aimed at preventing pressure ulcers and early assessment of risk factors of pressure ulcers.
4. Offer caregivers an education program on the value of proper skin care, diet, and repositioning.
5. Employees should receive training on how to spot pressure ulcers early and take preventative action.
6. Maintain accurate documentation of all skin examinations, repositioning plans, and patient condition modifications.

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