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# COMPARATIVE EFFECTIVENESS OF 2-HOURLY VERSUS 4-HOURLY REPOSITIONING FREQUENCIES IN REDUCING PRESSURE ULCER INCIDENCE AMONG ADULT PATIENTS AT RISK

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*Pressure ulcers, repositioning frequency, ICU patients, evidence-based practice, pressure injury prevention, quality improvement.*

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**Abstract**

***Background:*** *Pressure ulcers, also known as bedsores, are a common and serious complication among immobilized patients, particularly those in intensive care units (ICUs). Frequent repositioning is considered a standard preventive measure; however, its effectiveness and optimal frequency remain topics of debate.*

***Objective:*** *This evidence-based project aimed to evaluate the effectiveness of different repositioning frequencies in preventing the development of pressure ulcers among adult ICU patients.*

***Methods:*** *A quality improvement project was conducted at the adult ICU of Shifa International Hospital (SIH), involving nine purposively selected high-risk patients. An observational checklist was used to monitor patients' positioning practices, skin integrity, and clinical parameters. Patients were grouped based on repositioning frequency: every two, three, or four hours. Data were collected until discharge, transfer, or development of bedsores. Ethical approval and informed consent were obtained prior to the intervention.*

***Results:*** *The findings revealed that 80% of patients were repositioned every two hours, while 10% each received repositioning every three and four hours. Despite the high adherence to two-hour repositioning protocols, 45% of pressure ulcers developed within 6–8 hours of admission, 33% within 24–48 hours, and only 22% after 72 hours. These results challenge the assumption that more frequent repositioning is always more effective and suggest the need for individualized preventive strategies.*

***Conclusion:*** *The project highlights that early-onset pressure ulcers can occur despite standard repositioning protocols. It underscores the importance of context-specific interventions, comprehensive patient assessments, and possibly re-evaluating repositioning intervals based on patient condition rather than fixed schedules. Further research with a larger sample size is recommended to validate these findings and guide clinical practice.*

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## INTRODUCTION

### Background

Over the years, decubitus ulcers have been referred to as pressure ulcers, bedsores, pressure sores, and pressure injuries. The development of these ulcers is considered one of the major hospital-acquired complications, particularly among bed-bound patients. Despite advancements in healthcare technologies and the introduction of numerous preventive practices and equipment, pressure injuries continue to affect dependent patients. Although healthcare organizations strive to prevent such complications in bedridden patients, these efforts often prove ineffective.

### Problem Statement

The ongoing occurrence of pressure injuries in critically ill patients remains a significant concern and a frequently discussed issue at Shifa International Hospital, Islamabad. Efforts to prevent these injuries include multidisciplinary team involvement, the use of the Braden Risk Assessment Scale to evaluate patients' susceptibility, two-hourly repositioning by nursing staff according to standard guidelines, nutritional interventions, and the application of pressure-redistributing devices were ensured on daily bases. Despite these interventions, hospital-acquired pressure injuries persist in dependent patients, suggesting that current strategies may be insufficient.

In intensive care units (ICUs), where the nurse-to-patient ratio is typically 1:2 or 1:3, routine nursing responsibilities such as providing patient care, documenting observations, and administering medications make it challenging for nurses to reposition patients every two hours. This routine repositioning often compromises nurses' health, limits their meal breaks, and extends their duty hours, thereby increasing workload and stress. Moreover, the current practice of repositioning all patients every two hours does not consider individual patient needs, such as risk level, use of pressure redistribution devices, or staff workload. The absence of standardized protocols, lack of awareness, and insufficient evidence from previous research contribute to the continued use of a uniform repositioning approach.

### Purpose

The purpose of this evidence-based project was to investigate the comparative effectiveness of two-hourly versus four-hourly repositioning frequencies in reducing the incidence of pressure ulcers among at-risk adult patients at Shifa International Hospital (SIH), Islamabad.

### Objectives

1. To determine the incidence rate of pressure ulcer development among bedridden patients in critical care settings.
2. To compare the effectiveness of two-hourly versus four-hourly repositioning frequencies in preventing pressure injuries.

### Significance

This evidence-based research project serves as a pioneering initiative in the local context, aiming to shift healthcare providers' particularly nurses' perceptions about the optimal repositioning frequency for patients at varying risk levels of developing pressure ulcers.

The significance of this study lies in its potential to:

1. Inform the development of evidence-based guidelines for patient repositioning frequency.
2. Establish a foundation for future research on optimal repositioning intervals for pressure injury prevention.
3. Provide actionable evidence to support the implementation of more effective repositioning strategies.
4. Promote the integration of best practices into clinical care, thereby improving patient outcomes and quality of life.
5. Contribute valuable findings to the body of research on pressure ulcer prevention, aiding the development of future evidence-based interventions and policies.

## Literature Review

### Search Strategy

A comprehensive literature search was conducted to identify the best available evidence on repositioning frequency in the prevention of pressure injuries among adult patients. The primary databases used for the search included PubMed, Wiley Online

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Library, and Science Hub, aiming to retrieve evidence from both national and international research studies.

Initially, the search was restricted to studies published within the last ten years. However, due to the limited availability of relevant studies within this time frame and across the selected databases, Google Scholar was employed to broaden the scope of the search. As a result, some older but pertinent studies were also included to ensure a comprehensive literature review. The search was limited to English-language publications, with a specific focus on adult populations, repositioning frequency, and studies that offered accessible full-text versions.

The following keywords and phrases were used in various combinations with Boolean operators AND and OR to enhance search precision: "bed sore," "pressure ulcer," "pressure injuries," and "positioning frequency."

**The database-specific results were as follows:**

- **Google Scholar**: An initial title screening yielded approximately 1,500 studies. After the first level of screening (title review), 300 studies were identified as potentially relevant. Following abstract review (level two screening), 27 studies were selected for full-text evaluation. Ultimately, 10 studies were included in the final literature review.
- **PubMed**: The search produced 10 studies, of which 2 met the inclusion criteria after full-text screening.
- **Wiley Online Library** and **Science Hub**: No studies meeting the eligibility criteria were identified.

**Literature Review**

**Global Practices in Repositioning for Pressure Injury Prevention**

Global best practices underscore repositioning as a vital strategy in pressure ulcer prevention. However, discrepancies exist regarding the optimal frequency and methods of repositioning (Moore & Cowman, 2012). Clinically, regular patient repositioning is recognized as crucial for preventing pressure injuries, yet the most effective schedules and techniques remain unclear due to a lack of definitive evidence (Krapfl, 2008).

A study examining a structured positioning program found that adherence to standardized guidelines and the use of specialized equipment significantly reduced pressure ulcer scores and the incidence of peripheral nerve injuries among at-risk patients. Statistically significant improvements were noted in the intervention group compared to the control group ($p < 0.05$) (Niruntaweechai, 2023). Similarly, a systematic review assessing the effectiveness of repositioning systems reported a notable reduction in pressure ulcer incidence 2% in the intervention group versus 5.5% with standard care (Avsar, 2020).

**Repositioning Frequency**

A study by Yap (2022) evaluated repositioning intervals of 2, 3, and 4 hours in nursing home residents. The findings suggested that extending the 2-hour repositioning interval to 3 or 4 hours may be safe for many residents, as no new pressure injuries developed. Notably, compliance with repositioning improved with longer intervals. Gillespie et al. (2021) conducted a systematic review of eight trials involving 3,941 participants to evaluate the clinical and cost-effectiveness of repositioning schedules. The meta-analysis found no significant difference in pressure injury risk between 2-hourly and 4-hourly repositioning regimens. Another systematic review identified that repositioning every 2–3 hours reduced pressure ulcer incidence to 8%, compared to 13% with 4–6 hourly repositioning (Avsar, 2020). The odds ratio analysis indicated a 25% reduction in ulcer development (OR = 0.75; 95% CI: 0.61–0.90; $p = 0.03$). Kim et al. (2012) found that the median time for pressure ulcer development varied by risk level: 5 hours for mild/moderate risk, 3.5 hours for high risk, and 3 hours for very high risk. Their findings supported 3-hourly repositioning for moderate risk and 2-hourly for high/very high-risk patients. Wong (2011) conducted a pilot study measuring transcutaneous oxygen and skin temperature during 2-hour cycles. Although no significant differences were observed ($p > 0.5$), reduced sacral oxygenation was noted during prolonged supine positioning, emphasizing the need for consistent repositioning.

Avsar (2020) also reviewed the impact of designated turning teams, showing a significant reduction in pressure ulcer incidence: 11% in the intervention group vs. 20% in the control group (OR = 0.49; 95% CI: 0.27–0.86; $p = 0.01$). Still (2012) similarly

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demonstrated reduced incidence in surgical ICU patients following the implementation of a dedicated repositioning team.

**Repositioning with Pressure Redistribution Devices**

Assistive devices such as pressure-redistribution mattresses are essential adjuncts in pressure ulcer prevention. Vanderwee (2007) noted that frequent repositioning did not always reduce ulcer incidence when used with pressure-reducing surfaces, particularly for patients at low risk. For high-risk patients, standard 2-hourly repositioning remained crucial (Kim, 2012). Defloor (2005) found that repositioning every 4 hours on a variable-elevation mattress reduced pressure ulcer incidence effectively.

A comparative study by Defloor (2005) showed that the incidence of advanced pressure ulcers (grade II and above) was significantly lower (3.0%) in patients repositioned every 4 hours with pressure-reducing surfaces compared to those repositioned more frequently without such support (14.3%–24.1%).

Krapfl (2008) reviewed evidence from 1960 to 2008 and concluded that repositioning every 4 hours on a suitable surface could be as effective as 2-hourly repositioning. Vanderwee (2007) conducted an RCT across 16 Belgian nursing homes and found that a turning schedule combining 2-hour lateral and 4-hour supine repositioning slightly lowered ulcer incidence (16.4% vs. 21.2%), though the difference was not statistically significant ($p = 0.40$).

**Cost of Repositioning**

Moore (2013) found that an experimental repositioning protocol required only 18.5 minutes of nurse time per day compared to 24.5 minutes in the control group, resulting in a cost per patient of €206.6 versus €253.1. The experimental group also had a higher rate of patients remaining ulcer-free (96.6% vs. 88.1%). When scaled to 588 residents, the annual cost savings were projected at €510,000 equivalent to 58.8 hours of nursing time per week or 12 full-time nurses. Gillespie (2021) reported similar findings in a systematic review, noting that repositioning every 4 hours may be more cost-effective, with daily savings ranging from $11.05 to $16.74 per resident.

**Conclusion**

While repositioning is a standard practice in managing pressure ulcers, few randomized controlled trials have investigated its role in healing existing ulcers (Moore & Cowman, 2012). Optimal repositioning frequency and position remain uncertain, and the cost-effectiveness of different schedules is not well-supported by current evidence (Gillespie, 2021). Regulatory attention to pressure ulcer prevention is increasing, emphasizing the need for standardized, evidence-based repositioning protocols in clinical practice (Krapfl, 2008; Niruntaweechai, 2023). Current evidence supports repositioning as a key preventive strategy, but further high-quality research is needed to refine best practices (Avsar, 2020).

## Methodology

**Design**

This quality improvement project aimed to provide information and evidence on implemented measures for preventing bed sore development in incapacitated patients in critical care areas. Contextual evidence was evaluated over a specified time period to determine the most effective measure among the applied practices for bed sore prevention.

**Sample Size**

Nine (9) patients from adult intensive care units of Shifa International Hospital (SIH) were selected.

**Duration**

This evidence-based project was initiated and implemented from August 2023 to October 2023.

**Selection Criteria**

Patients were selected using a purposive sampling technique to ensure the recruitment of patients at risk of developing bedsores. This approach maintained a maximum range of similarity among recruited patients in terms of weight, age, gender, and Braden pressure ulcer development risk. Newly admitted ICU patients were also considered to ensure appropriate application and follow-up of the intervention.

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**Data Collection Method**

Patients were followed from admission to the Intensive Care Unit (ICU) until transfer out, discharge, death, or the development of bedsores. An observational checklist was used to document the following daily:

**Demographics:** Age, Gender, Weight, Diagnosis, Comorbidities, ICU Admission Date, Application of Pressure Redistribution Devices

- Shift-wise Monitoring: Glasgow Coma Scale (GCS), Positioning Frequency, PEEP, Temperature, Diet, Fluid Intake, Skin Condition, Invasive Lines
- Respiratory Support (e.g., Mechanical Ventilation, Oxygen Dependency, BiPAP/CPAP)
- Blood Sodium Level, Humidity, Skin Turgor, Hygienic Status, Use of Restraint Devices
- Length of Stay, I/O Balance

- **Additional Parameters Recorded:**

- Baseline Braden Scale score upon admission and every 48 hours
- Initial skin assessment including lesion documentation and photographic evidence (if permitted)
- Nutritional status using the Mini Nutritional Assessment tool
- Serum albumin levels and review of medications (e.g., steroids, vasopressors)
- Use of skincare protocols, moisture barrier creams, and pressure-relieving mattresses or devices
- Repositioning compliance tracked via time logs maintained by bedside nurses and cross-checked by the investigator
- Nursing workload, nurse-to-patient ratio, and availability of repositioning aids
- Patient comfort or pain scores during repositioning
- Inter-rater reliability ensured through periodic double assessment of skin condition using NPUAP/EPUAP staging

Below mentioned table showed the standardize parameters in all patients.

**Table Number 01**

**Standardized Parameters in All Patients**

| S.# | Similar Parameters in All Patients | Ranges |
|---|---|---|
| 1 | Room Temperature | 21 – 24°C |
| 2 | Room Humidity | < 60% |
| 3 | Hygiene Status | Good |
| 4 | Hygiene Status | Good |
| 5 | Activity and Mobility Status | Bed Ridden |
| 6 | Braden Risk Assessment Score | High |
| 7 | PEEP in Vented Patients | 5 cmH2O |
| 8 | Incontinence | No |
| 9 | Nurse-Patient Ratio | 1:1 /1:2 |

**Application of Evidence-Based Intervention**

Although the standard practice recommends repositioning every two hours for at-risk or dependent patients, this was found to be strenuous for nurses and ineffective, as bedsore rates remained high. Notably, patients restricted from repositioning due to surgical or medical reasons did not develop bedsores despite immobility for up to 72 hours. This observation warranted the evaluation of a three to four-hourly repositioning protocol. Based on supporting evidence from prior studies, the primary investigator developed and implemented a four-hour repositioning schedule. Patients were selected and monitored under this protocol.

**Ethical Considerations**

Approval to conduct the project was obtained from the nursing manager of Intensive care unit (ICU). Attendants of all selected patients were educated on the purpose of the project and the supporting evidence. Informed consent was obtained before enrolment in the study.

**Results**

Data were initially collected on the time duration for bedsore development and the standard repositioning frequency practices in ICU settings. This information was extracted from monthly critical care unit reports, focusing on pressure ulcer incidence

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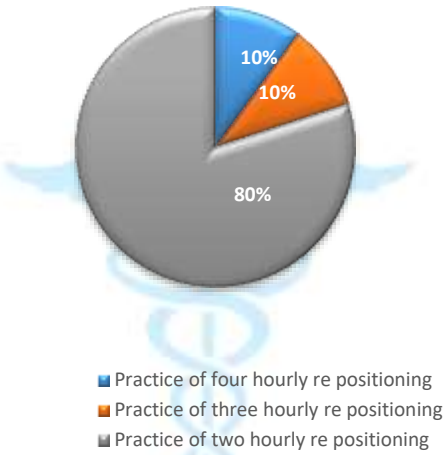
and one-month nursing documentation related to bedsore prevention. The objective was to determine the onset of pressure injuries post-ICU admission and evaluate the effectiveness of preventive interventions. Data analysis was conducted using Microsoft Excel and is presented in the following sections.

**Frequency of Repositioning Practices among Patients**

Below given figure 1 illustrates the distribution of repositioning frequency practices implemented for pressure injury prevention. The data reveals that the majority of patients (80%) were repositioned every two hours, aligning with standard repositioning guidelines. A smaller proportion of patients received repositioning every four hours (10%), while another 10% were repositioned every three hours. This distribution indicates that two-hourly repositioning remains the predominant practice in the facility under review.

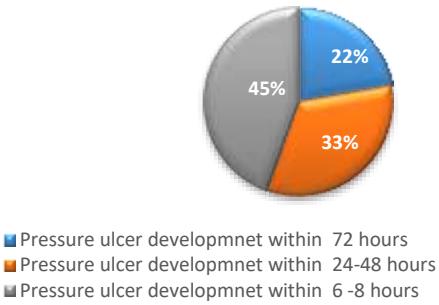
**Figure 1**
**Frequency of Repositioning Practices among Patients**




**Time Duration for Bed Sore Development**

Figure 2 demonstrates the distribution of time durations in which patients developed pressure ulcers during their stay in critical care. The largest proportion of pressure ulcers (45%) developed within 6 to 8 hours of admission, indicating rapid onset in some patients. Another 33% developed pressure ulcers within 24 to 48 hours, and only 22% of the cases occurred within 72 hours. These findings highlight the urgency of initiating early and effective pressure injury prevention strategies upon admission to intensive care units.

**Figure 2**
**Time Duration for Bed Sore Development**



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**Two-Hourly Repositioning**

Despite adherence to the standard repositioning frequency of every two hours, three out of four patients developed second-degree pressure ulcers on high-risk areas.

- **Patient 1:**

A 74 kg male with comorbidities including diabetes, hypertension, and ischemic heart disease, admitted with a diagnosis of right MCA infarct and NSTEMI. A second-degree pressure ulcer developed on the bilateral buttocks by the 9th day. His GCS fluctuated between 4 and 13/15. Sodium levels ranged from 135 to 163 mmol/L. Intake-output balance varied, and he was on nasogastric tube feeding with a Foley catheter. Skin turgor was normal.

- **Patient 2:**

A 56-year-old male weighing 80 kg with HBV, decompensated chronic liver disease, and diabetes developed a second-degree bedsore on the bilateral buttocks by day 4. He was alert (GCS 15/15), had a consistent positive fluid balance, but presented with loose, fragile skin and sodium levels below 130 mmol/L.

- **Patient 3:**

A 56-year-old male (68 kg) with a diagnosis of emphysema who underwent right thoracotomy and chest drain insertion developed a second-degree pressure injury on the scapular region by the 2nd ICU day. He was conscious (GCS 15/15), hemodynamically stable, and maintained positive I/O balance, but had loose skin and was on a clear liquid diet.

The detail is mentioned in table number 2.

**Table 2**

Two-Hourly Repositioning

| Parameter | Patient 1 | Patient 2 | Patient 3 |
|---|---|---|---|
| Pressure Redistribution Device | Gel Sheet | Air Mattress | Air Mattress |
| Gender | Male | Male | Male |
| Weight | 74 kg | 80 kg | 68 kg |
| Diagnosis | Rt. MCA Infarct, NSTEMI | HBV, DCLD | Rt. Emphysema |
| Comorbidities | DM, HTN, IHD | DM | DM |
| Age | 57 years | 56 years | 76 years |
| GCS | 4–13/15 | 15/15 | 15/15 |
| Surgical Procedure | Tracheostomy | Nil | Thoracotomy, Drain |
| Diet | NG Feed | Regular | Clear Liquids |
| I/O Balance | Mixed | Positive | Positive |
| Hemodynamics | 150–180/90–110 mmHg | 110–125/60–80 mmHg | 90–120/50–60 mmHg |
| Body Temperature | Normal | Normal | Normal |
| Length of ICU Stay | 9 days | 4 days | 2nd day |
| Ventilator Support | None | None | BiPAP (1 day) |
| Labs | Na = 135–163 | Na < 130 | Normal |
| Skin Turgor | Normal | Fragile | Loose |
| Bedsore | Yes | Yes | Yes |

**Note: Na:** Sodium, mmHg: Millimetre of Mercury, **NGT:** Nasogastric Tube, **HBV:** Hepatitis B Virus, **DCLD:** Decompensated Liver Disease, **MCA:** Middle Cerebral Artery, **NSTMI:** Non-ST-Elevation Myocardial Infarction, **DM:** Diabetes Mellitus, **HTN:** Hypertension, BiPAP: Bilevel Positive Airway Pressure, **HTN:** Hypertension, **IHD:** Ischemic Heart Disease

**Four-Hourly Repositioning**

Five patients were repositioned every four hours instead of two. All were monitored using the same checklist and preventive care protocols, including pressure redistribution devices. Notably, none of these patients developed pressure injuries during their ICU stay. All patients had compromised nutritional status: four were on nasogastric feeding, and one was nil per oral (NPO). Sodium levels ranged from 135 to 159 mmol/L. Comorbidities

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included DM, HTN, IHD, COPD, and pancreatic cancer. Three patients experienced intermittent temperature spikes.

The detail is mentioned in table number 3.

**Table 3**

Four-Hourly Repositioning

| Parameter | Patient A | Patient B | Patient C | Patient D | Patient E |
|---|---|---|---|---|---|
| Pressure Redistribution Device | Air Mattress | Air Mattress | Air Mattress | Gel Sheet | Gel Sheet |
| Gender | Female | Male | Female | Female | Male |
| Weight | 60 kg | 90 kg | 83 kg | 92 kg | 50 kg |
| Diagnosis | ICB, HTN | Status Epilepticus | Acute Stroke | Epilepsy, COVID-19 | RTA, Pneumocephalus |
| Comorbidities | HTN | COPD, HTN | DM, HTN, IHD | DM, Ca Prostate | Not significant |
| Age | 45 years | 75 years | 61 years | 70 years | 34 years |
| GCS | 4–11/15 | 6–15/15 | 6–11/15 | Sedated | Sedated |
| Surgical Procedure | Tracheostomy | Nil | Tracheostomy | Nil | Craniotomy, ORIF |
| Diet | NPO, NG Feed | NG Feed | NPO, NG Feed | NG Feed | NPO |
| I/O Balance | Positive | Positive | Positive | Positive | Positive |
| Hemodynamics | 120–140/70–100 mmHg | 80–140/40–90 mmHg | 120–150/67–80 mmHg | 90–120/70–90 mmHg | 120–135/70–80 mmHg |
| Body Temperature | Normal | Normal | Febrile Spikes | Febrile Spikes | Febrile Spikes |
| Length of ICU Stay | 9 days | 5 days | 7 days | 7 days | 5 days |
| Ventilator Days | 01 | 03 | 06 | 05 | 05 |
| Labs | Na = 142–156 | Na = 134–152 | Na = 138–150 | Not available | Na = 141–159 |
| Skin Turgor | Normal | Normal | Normal | Fragile | Normal |
| Bedsore | None | None | None | None | None |

**Note: COPD:** Chronic Obstructive Pulmonary Disease, **Ca:** Calcium, Kg: Kilogram, **NPO:** Nil per oral , **RTA:** Road Traffic Accident

## Discussion

The present analysis explored the impact of repositioning frequency on the development of pressure ulcers (PUs) in ICU patients. Contrary to traditional assumptions, the findings revealed that patients repositioned every two hours developed pressure ulcers, while those repositioned every four hours in combination with pressure redistribution devices did not. These findings challenge long-held clinical practices and align with emerging global evidence questioning the superiority of rigid 2-hour repositioning schedules.

Global best practices emphasize repositioning as a cornerstone of PU prevention (Moore & Cowman, 2012). Yet, there remains uncertainty regarding the optimal frequency and individualized repositioning regimens, with Krapfl (2008) suggesting that evidence is insufficient to endorse any one approach definitively. This ambiguity is echoed in the present study, where compliance with 2-hour repositioning did not prevent ulcer development, suggesting that frequency alone may be inadequate without consideration of patient-specific risk factors and support surfaces. The results are in line with Nalinthip Niruntaweechai (2023), who found that a structured repositioning program that includes equipment and clinical guidelines significantly reduces PU scores and nerve injury. This supports our finding that repositioning every four hours with pressure redistribution devices may offer protective benefits, especially in high-risk ICU patients. Moreover, recent literature demonstrates that extending repositioning intervals to 3–4 hours may be equally or more effective, particularly when implemented with specialized surfaces. For example, Gillespie et al. (2021) and Avsar (2020) found no significant difference between 2-hourly and 4-hourly repositioning in terms of PU incidence, but highlighted improved compliance and reduced staff burden with longer intervals. Our findings complement this, as none of the patients on a 4-

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hourly schedule developed PUs, despite having complex comorbidities and nutritional challenges.

Crucially, the Braden scale-based time-to-ulcer findings by Kim (2012) underscore the importance of risk-stratified repositioning, recommending 2-hourly turns only for high and very high-risk patients, and 3-hour intervals for moderate-risk patients. The current study reinforces this evidence, showing that uniform application of a 2-hour schedule may not suffice and that individual risk and physiological resilience (e.g., skin turgor, sodium levels) should dictate repositioning frequency. Interestingly, the patients who developed pressure ulcers under a 2-hour regimen showed additional risk indicators, such as fragile skin, altered sodium levels, and compromised GCS, despite use of gel sheets or air mattresses. In contrast, those under the 4-hour regimen even with severe neurological impairments and longer ICU stays remained ulcer-free, further validating the importance of a multimodal approach (repositioning + appropriate surface + clinical assessment).

While Wong et al. (2011) reported reduced sacral oxygenation during prolonged supine positioning, they also did not observe significant changes in skin parameters with 2-hourly repositioning. This suggests that merely following time-based repositioning protocols may not guarantee skin perfusion, and additional measures such as pressure-relieving devices and skin assessments are essential. From a systems perspective, the cost-effectiveness of extending repositioning intervals especially when supported by pressure redistribution surfaces is notable. Moore (2013) and Gillespie (2021) both demonstrated that 4-hourly repositioning leads to significant savings in nursing time and healthcare costs. The current findings support this economic rationale, suggesting that less frequent, yet more targeted repositioning can reduce ulcer incidence without increasing staff workload. Moreover, studies such as those by Defloor (2005) and Krapfl (2008) indicate that frequent repositioning without pressure-redistributing surfaces may offer no added benefit, and sometimes perform worse than less frequent repositioning when modern support surfaces are used. This was observed in our study, where patients on 2-hourly turns with gel sheets developed ulcers, while 4-hourly repositioning with gel or air mattresses showed no such development. Finally, the study by Still (2012) also supports the effectiveness of structured, protocol-driven repositioning teams, which might explain the favourable outcomes in the current study's 4-hour group where nursing documentation and device use appeared more systematic.

**Strengths of the project**

1. **Relevance:** The project addresses a significant issue in healthcare, specifically pressure ulcer prevention, which is a common problem in intensive care units.

2. **Methodology:** The study employs a systematic approach, including a comprehensive literature review and data collection from patient records.

3. **Data analysis:** The project presents a detailed analysis of the data, including comparisons between different repositioning frequencies and the use of pressure redistribution devices.

4. **Implications for practice:** The study's findings have the potential to inform evidence-based guidelines for repositioning frequency, enhancing patient care and outcomes.

**Limitations of the project:**

1. **Small sample size:** The study's sample size is relatively small, which may limit the generalization of the findings.

2. **Limited duration:** The project's duration is short, which may not capture the full range of factors influencing pressure ulcer development.

3. **Lack of control group:** The study does not include a control group, which makes it difficult to establish causality between the intervention and outcomes.

4. **Dependence on nursing documentation:** The project relies on nursing documentation, which may be subject to errors or biases.

**5. Limited consideration of individual patient factors:** The study does not fully account for

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individual patient factors, such as mobility, nutrition, and comorbidity, which may influence pressure ulcer risk.

6. **Lack of long-term follow-up:** The project does not include long-term follow-up, which may limit understanding of the sustained effects of the intervention.

**Future Research**

Here are some potential areas for future research:

1. Investigating the optimal repositioning frequency for specific patient populations, such as those with spinal cord injuries or neurological disorders.
2. Examining the effectiveness of alternative repositioning strategies, such as using turning teams or automated repositioning devices.
3. Developing and testing pressure ulcer prevention protocols that incorporate individual patient factors, such as mobility, nutrition, and comorbidity.
4. Conducting cost-effectiveness analyses of different pressure ulcer prevention strategies, including the use of pressure redistribution devices and repositioning frequency.
5. Investigating the impact of pressure ulcer prevention strategies on patient outcomes, such as quality of life, functional ability, and hospital length of stay.

**Conclusion**

This comprehensive project explores the effectiveness of different repositioning frequencies in preventing pressure ulcers in adult patients. The study's findings have significant implications for healthcare practice, policy, and future research. Here's a concise summary of the project's key points:

**Key Findings**

1. Repositioning frequency: The study suggests that repositioning patients every 4 hours may be as effective as repositioning every 2 hours in preventing pressure ulcers.
2. Pressure redistribution devices: The use of pressure redistribution devices, such as gel sheets and air mattresses, in conjunction with repositioning, may be effective in preventing pressure ulcers.
3. Individual patient factors: The study highlights the importance of considering individual patient factors, such as mobility, nutrition, and comorbidity, in pressure ulcer prevention.

**Implications for Practice**

1. Evidence-based guidelines: The study's findings can inform evidence-based guidelines for repositioning frequency and pressure ulcer prevention.
2. Personalized care: Healthcare providers should consider individual patient factors when developing pressure ulcer prevention plans.
3. Resource allocation: The study's findings can help healthcare organizations optimize resource allocation for pressure ulcer prevention.

**Future Research Directions**

1. Optimal repositioning frequency: Investigate the optimal repositioning frequency for specific patient populations.
2. Alternative repositioning strategies: Examine the effectiveness of alternative repositioning strategies, such as using turning teams or automated repositioning devices.
3. Pressure ulcer prevention protocols: Develop and test pressure ulcer prevention protocols that incorporate individual patient factors.
4. Cost-effectiveness analyses: Conduct cost-effectiveness analyses of different pressure ulcer prevention strategies.
5. Patient outcomes: Investigate the impact of pressure ulcer prevention strategies on patient outcomes, such as quality of life, functional ability, and hospital length of stay.

**Reference**

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