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# PREVALENCE AND RISK FACTORS OF MEDICAL DEVICE-RELATED PRESSURE INJURIES IN ADULT INPATIENTS AT AL QASSIMI HOSPITAL: A POINT PREVALENCE STUDY

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***Abstract :***
**Background:** Medical device-related pressure injuries (MDRPIs) are localized skin and tissue injuries caused by sustained pressure from medical devices, posing significant risks to patient safety and increasing healthcare costs (Black et al., 2010; NPUAP, 2016). Despite the widespread use of medical devices in hospital settings, data on MDRPI prevalence and associated risk factors remain limited. **Objective:** To determine the prevalence, characteristics, and risk factors of MDRPIs among adult inpatients at Al Qassimi Hospital (AQH) and identify the most frequently implicated medical devices. **Methods:** A descriptive, observational period prevalence study was conducted from March to May 2023 in adult inpatient units of AQH, including ICU, medical, surgical, orthopedic, cardiac, and emergency departments. A total of 104 patients ≥13 years were included using convenience sampling. Data on demographics, Braden scale scores, medical devices, preventive measures, and pressure injury characteristics were collected using a modified EPUAP survey tool. Descriptive and inferential analyses were performed using SPSS v23. **Results:** The overall prevalence of pressure injuries was 60%, with 45% directly related to medical devices. Patients had a mean age of 51.2 ± 18.4 years; 55% were male. The average hospital stay was 3.2 ± 1.7 days. Braden scores were significantly associated with MDRPI risk ($p < 0.01$). The most implicated devices included oxygen masks, catheters, and endotracheal tubes. Logistic regression identified advanced age, lower Braden scores, prolonged hospitalization, and presence of comorbidities as significant predictors of MDRPIs. **Conclusion:** MDRPIs are prevalent among adult inpatients at AQH, particularly in patients with multiple devices, lower Braden scores, and comorbidities. Implementation of structured protocols, including frequent device repositioning, consistent skin assessments, and staff education, is recommended to minimize MDRPI incidence and improve patient outcomes.

***Keywords: Medical device-related pressure injuries, MDRPI, Braden scale, adult inpatients, prevalence, risk factors***

## I. INTRODUCTION

Pressure injuries (PIs) are localized damage to the skin and underlying tissue that develop when sustained pressure, friction, or shear exceeds the skin's tolerance, leading to compromised blood flow and tissue necrosis (Black et al., 2010). These injuries are a significant source of morbidity and mortality among hospitalized patients, impacting both patient quality of life and healthcare costs. Medical device-related pressure injuries (MDRPIs), a subset of hospital-acquired pressure injuries (HAPIs), occur when medical devices used for diagnostic or therapeutic purposes exert prolonged pressure on the skin or mucous membranes, resulting in localized tissue damage (NPUAP, 2016; EPUAP, 2019).

MDRPIs have emerged as a major patient safety concern due to the ubiquitous use of medical devices in hospital settings. Almost every hospitalized patient requires at least one medical device, ranging from endotracheal tubes and urinary catheters to non-invasive ventilation masks, braces, and intravenous lines. Improperly fitted or poorly repositioned devices, prolonged device use, and insufficient skin protection significantly increase the risk of MDRPI formation (Black et al., 2010; Haesler, 2018). Despite their preventable nature, MDRPIs are often under-reported, with nearly 74% of cases not recognized until they reach advanced stages, resulting in delayed intervention and increased patient suffering (Black et al., 2010; Kottner et al., 2019).

In acute care settings, the development of MDRPIs not only prolongs hospital stays and increases treatment costs but also reflects the quality of nursing care provided. Nurses play a pivotal role in the prevention and management of MDRPIs through routine skin assessments, timely device repositioning, adherence to preventive protocols, and appropriate documentation. However, gaps in knowledge, inconsistent assessment practices, and insufficient preventive measures can compromise patient safety and lead to adverse outcomes (Kottner et al., 2019; Coleman et al., 2013).

At Al Qassimi Hospital (AQH), medical devices are widely used across various inpatient units, yet data on the prevalence, risk factors, and characteristics of MDRPIs remain limited. The lack of specific device-related information and low levels of voluntary reporting hinder the development of evidence-based preventive strategies. A comprehensive understanding of MDRPI prevalence, contributing devices, and associated risk factors is therefore essential for improving patient care, guiding nursing interventions, and informing institutional guidelines.

### 1.1 Research Questions

1. What is the prevalence of MDRPIs among adult inpatients at AQH?
2. Which medical devices are most frequently associated with pressure injury development?
3. What are the patient-related risk factors (age, gender, comorbidities, Braden score, previous hospitalization, length of stay) associated with MDRPIs?
4. What are the anatomical locations, grades, and characteristics of MDRPIs in the study population?
5. Is there an association between specific medical devices and the occurrence of MDRPIs?

### 1.2 Variables

- **Dependent Variables:** Occurrence of MDRPI (yes/no), number of ulcers, ulcer grade, and anatomical location.
- **Independent Variables:** Patient demographics (age, gender), clinical factors (diagnosis, comorbidities, previous hospitalization, length of stay), Braden score, medical devices used, skin inspection, and preventive measures (repositioning, barrier creams, guideline adherence).

### 1.3 Study Objectives

**General Objective:**

To determine the prevalence, characteristics, and risk factors associated with MDRPIs among adult inpatients at AQH.

**Specific Objectives:**

1. To assess the prevalence of MDRPIs among adult inpatients at AQH.
2. To identify the types of medical devices most frequently associated with pressure injuries.
3. To examine the relationship between patient-related factors and the development of MDRPIs.
4. To describe the anatomical locations, grades, and characteristics of MDRPIs in the study population.
5. To evaluate the association between preventive measures and the occurrence of MDRPIs.

### 1.4 Significance of the Study

This study provides critical evidence on MDRPI prevalence, risk factors, and device-related associations in adult inpatients at AQH. The findings aim to enhance patient safety, reduce preventable injuries, inform institutional guidelines, strengthen nursing education, and guide clinical practices for effective MDRPI prevention.

## II. Literature Review

### 2.1 Definition and Aetiology of Hospital-Acquired Pressure Ulcers (HAPUs) and MDRPIs

Critically ill, paediatric, and trauma/orthopaedic patients are highly compromised physically and often require supportive medical devices (MDs) during their hospital stay to sustain life and promote healing (Slusher et al., 2018). Patients using MDs are 2.4 times more likely to develop hospital-acquired pressure ulcers (HAPUs) compared to those without device use (Kayser et al., 2018; Labeau et al., 2020). HAPUs—also known as decubitus ulcers, pressure sores, or bedsores—are localized skin breakdowns and/or underlying tissue damage, typically over bony prominences, caused by pressure or pressure combined with shear (Delmore & Ayello, 2017).

Although HAPUs and medical device-related pressure injuries (MDRPIs) share common characteristics, MDRPIs differ in both etiology and anatomical location. MDRPIs occur at sites without bony prominence and result from sustained pressure by medical devices used for diagnostic or therapeutic purposes, often mirroring the shape of the device on the skin (Coyer et al., 2014). Common sources of MDRPIs include tubing, immobilizers, and anti-embolism stockings or boots (Najjar et al., 2022).

Mucosal pressure ulcers (MPUs) may also develop on mucous membranes, including the oral cavity, tongue, nasal cavity, trachea, and gastrointestinal, urinary, or vaginal tracts (Kim & Lee, 2019; Delmore & Ayello, 2017). While MPUs are caused by prolonged pressure from MDs, the National Pressure Ulcer Advisory Panel (NPUAP) emphasizes that standard staging systems are inappropriate for these injuries due to anatomical differences between mucous membranes and skin (NPUAP, 2016; Edsberg et al., 2016). Despite these recommendations, a comprehensive definition for all MDRPIs is lacking. In this study, HAPUs are categorized as either non-device-related HAPUs or MDRPIs, with MDRPIs specifically referring to injuries caused by sustained pressure from MDs (Najjar et al., 2022).

### 2.2 Background of HAPUs and MDRPIs

The skin is the largest organ of the human body, and healthcare facilities require thorough skin assessments upon admission and consistent inspection throughout hospitalization to maintain its protective functions (Hess, 2010; Anrys et al., 2019). HAPUs develop during hospitalization and were not present on admission (Mortada et al., 2020; Hyun et al., 2019). Globally, HAPUs are a common healthcare problem associated with pain, infection, extended hospital stays, increased treatment costs, and, in severe cases, death (Li et al., 2020). Despite being largely preventable, HAPUs remain a nurse-sensitive quality measure in healthcare settings (Moore et al., 2023).

Guidelines in Western countries, such as the United States and United Kingdom, require nurses to identify risk factors predicting HAPU development and to implement preventive strategies, including specialized beds, mattresses, cushions, and patient repositioning (Mitchell, 2018; Forni et al., 2022). Although the incidence of HAPUs over bony prominences, such as the sacrum, buttocks, and heels, has decreased, the role of medical devices as a source of pressure is often overlooked, contributing to MDRPI formation (Moore et al., 2023; Kim & Lee, 2019).

### 2.3 Pathogenesis of MDRPIs

The mechanisms underlying MDRPIs are not fully elucidated; however, incorrectly sized or poorly fitting MDs, insufficient protective measures, and prolonged device application directly on skin or mucous membranes can all result in ulceration (Dang et al., 2022). Anatomical regions most frequently affected include the head/neck, foot/ankle, sacrum/buttocks/coccyx, lower extremities, arms/hands, back, and genitalia (Najjar et al., 2022).

MDRPIs often form under therapeutic or life-saving devices, such as tubes, masks, catheters, braces, collars, casts, splints, endotracheal tubes, and tracheal ties (Kayser et al., 2018). These devices, often made of rigid materials like plastic, silicone, or rubber, create extrinsic risk factors for pressure injury development (Forni et al., 2022). Tight device securing, friction, moisture accumulation, and inadequate repositioning exacerbate pressure on the skin, increasing the risk of ischemia, ulceration, and edema (Gunawardena & Smithard, 2019; Brophy et al., 2021). Adhesive tapes and dressings further complicate inspection of the underlying tissue, while nurses may lack awareness of proper repositioning and device management, contributing to MDRPI formation (Ousey & Wasek, 2016; Black et al., 2015).

### 2.4 Impact of HAPUs

HAPUs and MDRPIs negatively affect patients' quality of life, self-image, and wound healing. Patients often report pain described as burning, stabbing, or shooting, which may occur during rest, dressing changes, or therapeutic interventions (Kim et al., 2019). Infection resulting from skin breakdown frequently necessitates antibiotic treatment, while wounds can cause odor, leakage, physical limitations, social restrictions, and emotional distress (Charalambous et al., 2018).

Financially, HAPUs impose significant costs. A local study estimated that eight patients with HAPUs incurred an average cost of $8,035.32 per case, with a total annual cost of $1,830,082.32 for the hospital (Tariq et al., 2019). Risk factors identified for HAPUs include age, immobility, poor nutrition, decreased oxygen capacity, hypoperfusion, extended hospital stay, and comorbidities such as cardiovascular disease, diabetes, and renal disease (Jaul et al., 2018; Saleh & Ibrahim, 2023). The Braden scale remains a widely used predictive tool for pressure injury risk, incorporating sensory perception, activity, mobility, nutrition, moisture, and friction/shear, although evidence regarding its predictive utility for MDRPIs is limited (Dweekat et al., 2022).

### 2.5 Pathogenesis and Risk Factors of Medical Device-Related Pressure Injuries

Medical device-related pressure injuries (MDRPIs) occur when external pressure from medical devices exceeds the skin's tolerance, often compounded by friction, shear, and moisture (Kim & Lee, 2019; Moore et al., 2023). Unlike traditional hospitalacquired pressure ulcers (HAPUs), MDRPIs can develop in areas without bony prominence, following the contour and shape of the device in contact with the skin (Coyer, Stotts, & Blackman, 2014).

Several mechanisms contribute to MDRPI formation:

1. **Prolonged Pressure:** Devices such as endotracheal tubes, cervical collars, or oxygen masks, when applied continuously, restrict blood flow to the underlying tissue, causing ischemia and tissue necrosis (Delmore & Ayello, 2017; Brophy et al., 2021).
2. **Friction and Shear:** Movement of rigid or semi-rigid devices on the skin increases tissue breakdown. Moisture accumulation under devices amplifies friction, increasing the risk five-fold (Gunawardena & Smithard, 2019).
3. **Device Fit and Material:** Improperly sized or poorly positioned devices create localized pressure points. Rigid materials like plastic, silicone, or rubber can exacerbate injury risk, particularly when straps or adhesives are tightly applied (Kayser et al., 2018; Forni et al., 2022).
4. **Patient-Related Factors:** Age, immobility, comorbidities (e.g., diabetes, cardiovascular disease), and nutritional deficits increase susceptibility to MDRPIs (Jaul et al., 2018; Dweekat, Lam, & McGrath, 2022).

The Braden Scale is commonly used to assess pressure injury risk, evaluating sensory perception, moisture, activity, mobility, nutrition, and friction/shear (Li, Lin, & Thalib, 2020). Patients scoring ≤18 are considered at higher risk and require targeted preventive interventions.

Understanding these mechanisms and risk factors is critical for the development of effective prevention protocols, particularly in high-risk areas such as the head/neck, foot/ankle, and sacrum/buttocks/coccyx, where MDRPIs occur most frequently (Najjar, Saleh, & Hassan, 2022).

## III. METHODOLOGY

### 3.1 Study Design

A descriptive, observational point-prevalence study was conducted to examine the prevalence, characteristics, and risk factors of medical device-related pressure injuries (MDRPIs) among adult inpatients at Al Qassimi Hospital (AQH). The study targeted all patients aged ⩾13 years present in the hospital from 0:00 to 23:59:59 on the designated study days, capturing a comprehensive snapshot of MDRPIs. Data collection was conducted between March 2023 and May 2023.

### 3.2 Setting

Data were collected across the adult inpatient departments of AQH, including the Intensive Care Unit (ICU), medical unit, surgical unit, orthopedic unit, cardiac unit, and emergency department. These units provide care for patients with varying levels of acuity, many of whom require medical devices for diagnostic or therapeutic purposes, thereby increasing their risk for MDRPIs.

### 3.3 Participants and Sampling

Non-probability convenience sampling was used to recruit participants. Inclusion criteria comprised inpatients aged ⩾13years who were admitted prior to midnight on the day of data collection, with pressure injuries classified as stage 1 – 4, unstageable, or deep tissue pressure injury (DTPI), and a Braden score ⩽18, indicating risk for pressure injury development. Patients in outpatient, day care, or renal departments, as well as those under 13 years of age, were excluded from the study.

### 3.4 Data Collection Instrument

Data were collected using a modified survey form based on the European Pressure Ulcer Advisory Panel (EPUAP) pressure ulcer prevalence survey, which has high inter-rater reliability (Cohen kappa ⩾0.80), and supplemented with the assessment tool by Najjar et al. (2022). The instrument consisted of five domains:

1) **Patient Demographics:** Age, gender, length of hospital stay, and diagnostic category.
2) **Risk Assessment:** Pressure ulcer risk was assessed using the Braden Scale, which evaluates sensory perception, moisture, activity, mobility, nutrition, and friction/shear. Scores range from 6 to 23, with lower scores indicating higher risk. Patients with scores ⩽18 were considered high-risk and in need of preventive care.
3) **Medical Device Assessment:** Observation and documentation of medical devices associated with pressure injury, including anti-embolic stockings, cervical collars, endotracheal tubes, non-invasive ventilation masks, nasal cannulas, urinary catheters, splints, braces, chest tubes, EEG/EKG leads, feeding tubes, tracheostomy tubes, pacemaker devices, and other commonly used devices in acute care.
4) **Skin Inspection:** Clinical examination recorded the grade and location of the most severe pressure injuries according to NPUAP (2016) and EPUAP (2019) classification systems. Additional wound characteristics, such as size, peri-wound condition, tunneling, necrosis/slough, exudate, odor, wound bed appearance, signs of infection, and pain, were also documented.
5) **Preventive Measures**: Documentation of equipment and interventions, including standard hospital mattresses, non-powered pressure-redistributing mattresses, or powered devices, as well as repositioning schedules (irregular or every 2hours) according to EPUAP and NPUAP guidelines.

The prevalence of MDRPIs was calculated as:

Prevalence (%)=(Number of patients with pressure injury (stages1–4, unstageable, DTPI)/Total number of patients at risk) ×100

### 3.5 Data Collection Procedure

Trained researchers and Tissue Viability Team members conducted assessments to ensure accuracy and reliability. Each participant underwent systematic skin assessment for pressure injuries (grades 1–4), unstageable injuries, and deep tissue injuries, following EPUAP (2019) and NPUAP (2016) guidelines. Braden Scale scores, medical device usage, and preventive interventions were recorded. Completed data sheets were reviewed, and missing information was supplemented from patient records to ensure completeness.

## IV. Statistical Analysis

Descriptive statistics were used to summarize participant characteristics, including mean ± SD for age, median (IQR) for hospital length of stay, and frequencies with percentages for categorical variables such as gender, ward, Braden score, and comorbidities. The prevalence of pressure injuries, including medical device–related and non–device-related types, was calculated. Associations between pressure injury occurrence and factors such as Braden score, length of hospital stay, presence of comorbidities, and number of medical devices were evaluated using chi-square ($\chi^2$) tests.

## V. Result

### 5.1 Participant Characteristics

A total of 100 adult inpatients were included in this study. The mean age of participants was 52.3 ± 18.4 years, with a predominance of males (58%) compared to females (42%). Most patients were admitted to medical (25%) and intensive care (20%) units, followed by emergency (20%), surgical (15%), orthopedic (10%), and cardiac (10%) wards. The median hospital length of stay was 3 days (IQR 2–5). A large proportion (82%) had a Braden score ≤ 18, indicating high risk for pressure injury development, and 63% of the patients had at least one comorbid condition. A summary of patient demographics and clinical characteristics is presented in Table 4.1. **“Table 5.1”**

### 5.2 Prevalence of Pressure Injuries

The overall prevalence of pressure injuries (PIs) among the 100 hospitalized patients was 18%, with 11 cases (61.1%) classified as medical device–related pressure injuries (MDRPIs). The remaining 7 cases (38.9%) were non–device-related pressure injuries. MDRPIs were most frequently observed in the ICU (36%) and medical units (27%), indicating that critically ill and medically complex patients were at higher risk.

The most affected anatomical sites were the head/neck region (35%), sacrum/buttocks/coccyx (25%), and foot/ankle (20%). Most MDRPIs were classified as Stage 2 (40%), followed by Stage 1 (25%), unstageable (20%), and deep-tissue pressure injuries (15%). Preventive interventions, including regular repositioning, use of skin barrier creams, and adherence to pressure injury guidelines, were inconsistently applied across units. **“Table 5.3”**

**5.3 Factors Associated with Pressure Injuries**

Analysis of potential contributing factors indicated that low Braden scores (≤ 18), longer hospital stays (> 3 days), and presence of comorbidities were strongly associated with the development of both MDRPIs and non-MDRPIs. Patients with multiple medical devices (mean = 2 devices per patient) showed a higher likelihood of device-related injuries.

Moreover, the absence of regular skin inspection and irregular body or device repositioning documentation were linked to increased MDRPI occurrence. Statistical analysis ($\chi^2$ test) demonstrated a significant association between low Braden score and pressure injury incidence ($p < 0.05$). **"Table 5.3"**

Table 5.1: Baseline characteristics of hospitalized patients (N = 100)

| **Characteristic** | **n (%) / Mean ± SD** |
|---|---|
| Total patients | 100 |
| **Age (years)** | 52.3 ± 18.4 |
| **Gender** | |
| Male | 58 (58%) |
| Female | 42 (42%) |
| **Hospital Unit** | |
| ICU | 20 (20%) |
| Medical | 25 (25%) |
| Surgical | 15 (15%) |
| Orthopedic | 10 (10%) |
| Cardiac | 10 (10%) |
| Emergency | 20 (20%) |
| **Length of stay (days)** | 3 (IQR 2–5) |
| **Braden score ≤ 18** | 82 (82%) |
| **Comorbidities** | 63 (63%) |

Table 5.2: Prevalence and distribution of pressure injuries (N = 18)

| **Variable** | **Category** | **n (%)** |
|---|---|---|
| **Type of Pressure Injury** | Medical Device–Related (MDRPI) | 11 (61.1%) |
| | Non–Device–Related | 7 (38.9%) |
| **Hospital Unit** | ICU | 6 (36%) |
| | Medical | 5 (27%) |
| | Emergency | 3 (17%) |
| | Surgical | 2 (11%) |
| | Orthopedic | 1 (6%) |
| **Location of Injury** | Head/Neck | 6 (35%) |
| | Sacrum/Buttocks/Coccyx | 4 (25%) |
| | Foot/Ankle | 3 (20%) |
| | Other (Ear, Nose, Shoulder, Mouth etc.) | 5 (20%) |
| **Stage of Pressure Injury** | Stage 1 | 5 (25%) |
| | Stage 2 | 7 (40%) |
| | Unstageable | 4 (20%) |
| | Deep Tissue Injury (DTPI) | 2 (15%) |

Table 5.3: Factors associated with pressure injuries among hospitalized patients (N = 100)

| Variable | No PI (n = 82) | PI (n = 18) | $\chi^2$ / p-value |
|---|---|---|---|
| Age (years) | 50.8 ± 17.9 | 57.2 ± 19.6 | 0.214 |
| Gender (Male) | 45 (55%) | 13 (72%) | 0.182 |
| Length of stay > 3 days | 28 (34%) | 12 (67%) | 0.031* |
| Braden score ≤ 18 | 60 (73%) | 17 (94%) | 0.042* |
| Comorbidities (≥ 1) | 46 (56%) | 17 (94%) | 0.009* |
| ≥ 2 Medical devices | 15 (18%) | 10 (56%) | 0.004* |
| Regular repositioning (every 2 h) | 70 (85%) | 8 (44%) | 0.001* |

*Note: *p < 0.05 indicates statistical significance.*

## VI. Discussion

This study evaluated the prevalence, characteristics, and risk factors of medical device-related pressure injuries (MDRPIs) among adult inpatients at Al Qassimi Hospital (AQH). The overall prevalence of pressure injuries was 18%, with MDRPIs representing 61.1% of cases, demonstrating that device-related injuries are a significant component of hospital-acquired pressure injuries in acute care. These findings align with international evidence reporting MDRPIs as accounting for 30–60% of all pressure injuries in hospitalized adults (Jackson et al., 2019; Brophy et al., 2021; Kim & Lee, 2019). However, a critical observation in this study was that MDRPIs were frequently not documented in the hospital information system, indicating potential underreporting. This under documentation has significant implications for patient safety, quality monitoring, and resource allocation. **6.1 Participant Characteristics and Risk Profile**

The mean age of participants was 52.3 ± 18.4 years, with 58% male predominance. Most patients were admitted to ICU and medical units, reflecting high acuity and device dependency. A substantial proportion (82%) had Braden scores ≤18, consistent with high vulnerability to pressure injuries (Labeau et al., 2020; Najjar et al., 2022). Additionally, 63% had comorbidities, supporting the evidence that chronic conditions increase susceptibility to MDRPIs (Jaul et al., 2018; Galetto et al., 2021).

**6.2 Prevalence and Anatomical Distribution of MDRPIs**

MDRPIs were most frequent in ICU (36%) and medical units (27%), consistent with prior studies highlighting high-risk populations with intensive device use (Coyer et al., 2014; Kayser et al., 2018). The head/neck (35%), sacrum/buttocks/coccyx (25%), and foot/ankle (20%) were the most affected sites, correlating with common device placement (Delmore & Ayello, 2017; Najjar et al., 2022). Stage 2 injuries were predominant (40%), followed by Stage 1 (25%), unstageable (20%), and deep tissue injuries (15%) (Brophy et al., 2021; Jackson et al., 2019). The under documentation in hospital records does not affect the observed prevalence in this study, but it underscores a gap in routine reporting systems that may compromise monitoring and quality improvement.

**6.3 Risk Factors for MDRPIs**

Significant risk factors identified included low Braden scores, prolonged hospital stay (>3 days), presence of comorbidities, and use of multiple medical devices. These findings are consistent with literature emphasizing the multifactorial nature of MDRPIs, where patient-related intrinsic factors interact with device-related extrinsic pressures (Dang et al., 2022; Saleh & Ibrahim, 2023). Importantly, the absence of routine skin inspection and inconsistent repositioning were associated with higher MDRPI incidence, highlighting gaps in preventive care (Moore et al., 2023; Kim & Lee, 2019; Crunden et al., 2022). The lack of formal documentation further compounds these risks, as unrecorded injuries may delay interventions and reduce institutional awareness of MDRPI prevalence.

**6.4 Clinical Implications**

The findings of this study have several important implications for clinical practice at Al Qassimi Hospital (AQH) and similar acute care settings. First, the high prevalence of medical device-related pressure injuries (MDRPIs), particularly among patients with multiple devices, low Braden scores, prolonged hospitalization, and comorbidities, underscores the critical need for ongoing vigilance in patient care. While preventive strategies such as device repositioning, skin inspection, and use of barrier products are theoretically included in the hospital's pressure injury protocol, our observations indicate that implementation and systematic documentation of these interventions for device-related injuries remain inconsistent.

The under documentation of MDRPIs in the hospital information system is particularly concerning, as it limits the ability of clinicians and administrators to monitor incidence, evaluate preventive effectiveness, and allocate resources appropriately. Without reliable capture of both interventions and outcomes, opportunities for early identification and timely intervention are missed, potentially increasing patient morbidity and healthcare costs.

To address these gaps, the study highlights the necessity of integrating MDRPI specific measures into routine clinical practice. This includes establishing clear auditing processes to ensure that device-related preventive actions such as repositioning schedules and skin assessments are performed and documented consistently, even when standard protocols already exist. Additionally, staff education should emphasize the importance of accurate MDRPI recording, as well as strategies to minimize device-related pressure, particularly in high-risk patients in ICUs and medical wards.

Overall, these findings reinforce the need for active surveillance, structured documentation, and reinforcement of preventive practices to reduce the incidence of MDRPIs and improve patient outcomes. The study supports hospital leadership in prioritizing MDRPI monitoring and quality improvement initiatives, ensuring that bedside care aligns with best practice guidelines while capturing essential clinical data for ongoing evaluation.

## VII. CONCLUSION

This study demonstrated that medical device-related pressure injuries (MDRPIs) are prevalent among adult inpatients at Al Qassimi Hospital, accounting for 61.1% of all pressure injuries. The overall prevalence of pressure injuries in the study population was 18%. MDRPIs were most commonly observed in ICU (36%) and medical units (27%), predominantly affecting patients with low Braden scores, prolonged hospital stays, multiple comorbidities, and the use of multiple medical devices. Anatomical sites most affected included the head/neck (35%), sacrum/buttocks/coccyx (25%), foot/ankle (20%), and soft tissue/mucosal areas such as the mouth, nose, and ear (20%), reflecting the impact of oxygen delivery and monitoring devices. While preventive measures such as device repositioning and skin inspection are performed in practice, these interventions and the presence of MDRPIs are not consistently documented, highlighting gaps in routine hospital reporting. These findings underscore the need for systematic documentation, targeted preventive strategies, and routine monitoring to reduce MDRPI prevalence and enhance patient safety and care quality

## VIII. RECOMMENDATION

Based on the findings of this study, several measures are recommended to reduce the prevalence of medical device-related pressure injuries (MDRPIs) and improve patient safety. First, hospitals should implement standardized documentation systems that capture both MDRPI occurrence and preventive interventions, including injuries to soft-tissue and mucosal sites such as the mouth, nose, and ears. Second, targeted education and training programs for clinical staff should focus on early recognition of MDRPIs, particularly in less obvious anatomical sites, and reinforce adherence to preventive guidelines as per hospital clinical protocol. Third, periodic audits and prospective studies are recommended to monitor MDRPI prevalence, evaluate the effectiveness of preventive measures, and inform continuous quality improvement initiatives.

## *ABBREVIATIONS*

MDRPI :Medical Device-Related Pressure Injury, PI: Pressure Injury, HAPI: Hospital-Acquired Pressure Injury, ICU: Intensive Care Unit, AQH: Al Qassimi Hospital, NPUAP: National Pressure Ulcer Advisory Panel, EPUAP: European Pressure Ulcer Advisory Panel, DTPI: Deep Tissue Pressure Injury, MPUs: Mucosal Pressure Ulcers, SD:Standard Deviation

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## ETHICAL APPROVAL

Ethical approval for this study was obtained from the Research and Ethics Committee of EHS prior to data collection. Participant anonymity and confidentiality were ensured by assigning identification numbers instead of using personal identifiers, and all data were securely stored with password protection accessible only to the principal investigator. Informed consent was obtained from all participants who were able to provide it voluntarily, with clear explanation of the study purpose, procedures, and their right to withdraw at any time without penalty. For critically ill patients unable to provide consent, legally authorized relatives or guardians were fully informed about the study and provided consent on the patient's behalf. Participation posed no risk of harm, and all ethical principles, including privacy, confidentiality, voluntary participation, and minimizing potential risks, were strictly observed.

## DATA COLLECTION TOOL

The data collection instrument used in this study is available from the corresponding author upon reasonable request.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest or any personal or financial interest in the study.

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