

# Retrospective Evaluation of Pressure Sores of Patients in Intensive Care

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## ABSTRACT

**Objective:** Pressure ulcers are a health problem that can be seen in hospitalized patients in intensive care units (ICU). Malnutrition, advanced age, impaired circulation, immobilization, reduced sensory perception, infection, incontinence, moisture, neurological deficit, sedation, and friction may play a role in development of pressure ulcers. Pressure ulcers should be prevented and must be treated aggressively when they occur. This study analyzed occurrence of pressure ulcers in ICU patients.

**Methods:** Records of patients treated in hospital ICU between January 2012 and May 2013 were analyzed retrospectively. Demographic and clinical characteristics of patients, risk of developing pressure ulcers, duration and degree of pressure ulcers, parts of body affected, and treatment results were evaluated.

**Results:** A total of 461 patients were included in the study. While 3 patients (0.7%) had existing pressure ulcers on ICU admission, 14 patients (3%) developed new pressure ulcers, and 444 patients (96.3%) did not develop pressure ulcers. Pressure ulcers most often occurred 25 to 50 days after admission.

**Conclusion:** Patients admitted to ICU should be evaluated for pressure ulcers, necessary measures should be taken for patients at risk of developing pressure ulcers to avoid their development, and any pressure ulcers should be treated effectively.

## INTRODUCTION

Pressure ulcers occur as result of long-term pressure exerted on the skin and subcutaneous tissue. External pressure, especially on bony prominences of the body causes ischemic lesions to emerge, and if this pressure is not relieved, then cell death and tissue necrosis occur.<sup>[1-3]</sup>

The most important factor in development of pressure ulcers is external compression; however, there are also other contributory factors. Paralysis, advanced age, prolonged immobilization, circulatory disorders, necrosis, severe malnutrition, sensory disorders, infection, incontinence, and lower than normal levels of albumin or hemoglobin can all facilitate development of these wounds.<sup>[1-4]</sup> Frequent use of sedatives or anesthesia can impair sensory perception.<sup>[2,5]</sup>

Pressure ulcers are classified in following 4 stages according to clinical manifestation based on recommendations of National Pressure Ulcer Advisory Panel (NPUAP):<sup>[6]</sup>

Stage-1: Skin integrity is not impaired, but existing erythema does not fade after removal of the pressure;

Stage-2: Partial loss of dermis, and formation of bullae is observed;

Stage-3: Involvement of subcutaneous tissue layers to the muscular layer;

Stage-4: Bone and joint involvement is detected.

Different risk assessment scales have been used in the evaluation of pressure ulcers. Braden Scale for Predicting Pressure Ulcer Risk is one of these tools and has a high predictive value. It evaluates 6 subdimensions: mobility, ac-

tivity, sensory perception, nutrition, moisture, friction and shear (Table 1) with a score that ranges between 6 and 23 points.<sup>[7,8]</sup>

Nearly 70% of pressure ulcers are seen in adults older than 65 years of age and manifest on the sacrum and heels. In acute care settings, incidence of potential development of new ulcers varies between 0.4% and 38% (median: 7%). [9] In intensive care units (ICU), incidence can reach 56%. [1] In the present study, occurrence of pressure ulcers among patients treated in reanimation ICU, relevant risk factors, and treatment outcomes were analyzed.

## MATERIAL AND METHODS

After obtaining the approval of the ethics committee, records of patients who received ICU follow-up care in tertiary care hospital between January 2012 and May 2013 were retrospectively analyzed. A total of 461 patients (female: n=186; male: n=275) were enrolled in the study.

Demographic and clinical data were retrieved from patient files kept by physicians and nurses. Patient age, gender, name of ICU where treated, diagnosis, number of ICU admissions, duration of stay, risk of decubitus ulcer, presence (if any) of pressure ulcer, anatomical location and severity of pressure ulcer, number of days hospitalized before development of pressure ulcer, Acute Physiology and Chronic Health Evaluation (APACHE) II score of patient on ICU admission, and health state of patient when discharged were recorded. Braden scale was used to record risk assessment for pressure ulcer. Pressure ulcers were evaluated according to 4 stages described in NPUAP recommendations.

At time of study, air-bearing beds were used in reanimation ICU. In order to prevent pressure ulcers, position of patients was changed every 2 hours, and protective silicon pads were used for their heels. Indwelling urethral catheters were used for urinary drainage. Regardless of level of consciousness, adult disposable underpads were used, and were replaced at least twice a day to prevent urine leakage and keep skin dry.

## RESULTS

A total of 461 follow-up patients (female: n=186, 40.3%; male: n=275, 59.7%) in reanimation ICU from between January 1, 2012 and May 31, 2013 were included in the study.

Most patients were admitted to reanimation ICU from operating room immediately after surgery (n=237). Emergency services (n=6), hospital inpatient services (n=181), another ICU of hospital (n=3), and other hospitals located in and outside of the province (n=34) were other sources of admission (Figure 1).

Patients admitted were in various diagnostic groups and injuries included trauma, bone fracture, firearm injury, poisoning, cancer, pneumonia-Chronic Obstructive Pulmonary Disorder (COPD), cerebrovascular event (bleeding, infarct), renal failure, heart failure, aortic aneurysm, and post-CRP (Figure 2).

Patients were admitted to ICU for first (n=454; 98.5%), second (n=6; 1.3%), and third (n=1; 0.2%) time.

According to Braden risk assessment scale, patients were at low (9.2%), moderate (37.6%), high (41.8%), and very high (11.4%) risk for development of pressure ulcers (Figure 3). Three (0.7%) patients who were admitted had pressure ulcers previously. In 14 (3%) patients, pressure ulcers were detected during follow-up, and in 444 (96.3%) patients, no pressure ulcers developed.

Newly developed pressure ulcers occurred most frequently between 31 and 40 days (usually, between 25 and 50 days) after hospitalization (Figure 4).

Pressure ulcers were localized in the gluteal (sacral) region (n=13) and heels (n=4). Grading of pressure ulcers based on NPUAP classification revealed stage 1 (n=5), 2 (n=10), and 3 (n=1) pressure ulcers in respective number of patients.

APACHE II scores of patients within 24 hours of admission to ICU were also recorded (Figure 5).

**Table 1.** Braden scale for predicting pressure ulcer risk

Sensory perception	Completely limited	Very limited	Slightly limited	No impairment
Moisture	Constantly moist	Very moist	Occasionally moist	Rarely moist
Activity	Bedfast	Chairfast	Walks occasionally	Walks frequently
Mobility	Completely immobile	Very limited	Slightly limited	No limitation
Nutrition	Very poor	Probably inadequate	Adequate	Excellent
Friction and shear	Problem	Potential problem	No apparent problem	
Points	1	2	3	4

High risk: ≤12; Moderate risk: 13–14; Low risk: 15–16 (age >75 15–18).

## DISCUSSION

Physical activity of patients hospitalized in ICU is almost always restricted. Patients are often not able or are less able to change physical position. Therefore, body is subjected to pressure more intensively and for longer periods of time. Allman et al.[10] demonstrated that erythema, lymphopenia, immobility, dry skin, and decreased body weight were risk factors for development of pressure ulcers, and Frankel et al.[11] noted that old age (>60 years), diabetes, spinal cord injury, and renal failure were also independent risk factors.

In patients who undergo major surgery, and especially in cases of sepsis, trauma, and burns, nutritional disorders can occur due to changes in metabolism. Metabolism changes can cause negative nitrogen balance with resultant loss of subcutaneous tissue.[2] Energy requirement of all patients hospitalized in reanimation ICU was calculated every day and necessary nutrition was provided through parenteral or enteral route.

Achievement of normovolemia and maintaining albumin and hemoglobin levels aid in prevention and healing of pressure ulcers.[1,2] Patients in ICU were monitored for fluid balance, and hemoglobin and albumin levels were controlled with replacements provided as needed. Hemoglobin level target was 10 gr/100 mL.

Humid environment increases risk of development of pressure ulcer. Sweating, fecal incontinence, and oozing from wound may lead to moist wound site. When urethral catheter is used, urinary incontinence does not induce

formation of moist wound site;[2] therefore, urinary drainage of patients was accomplished in ICU using indwelling urethral catheter. Irrespective of consciousness level of patients, adult disposable underpads were used to prevent urinary or fecal leakage and moistening of skin, and these pads were replaced at least twice daily.

Primary objective in treatment of pressure ulcers is primary prophylaxis (prevention of occurrence). To achieve this, removal of pressure for 5 minutes every 2 hours suffices. In paralytic patients, static and dynamic support systems have been developed to minimize pressure. Static support systems include various wound dressings such as sponge and silicon gel pads, and dynamic devices such as airflow mattresses are also used.[12] In our reanimation ICU, all patient beds are air-bearing beds. If not contraindicated, in order to prevent formation of pressure ulcers, position of patient is changed every 2 hours and protective heel pads made of silicon are used.

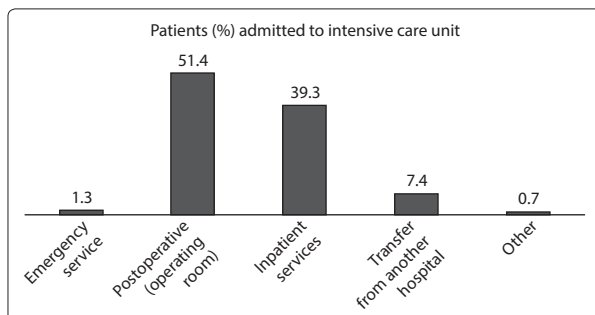


Figure 1. Health state of patients admitted to the intensive care unit.

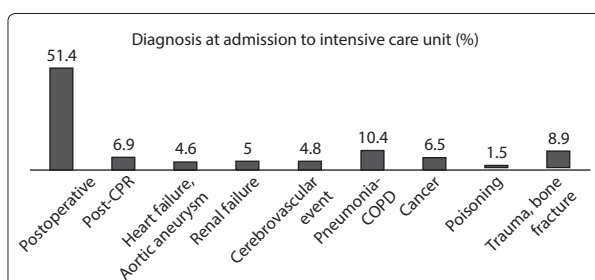


Figure 2. Diagnosis at admission to intensive care unit.

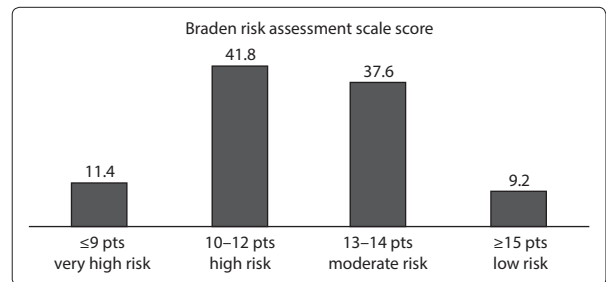


Figure 3. Braden risk assessment scale for development of pressure ulcers.

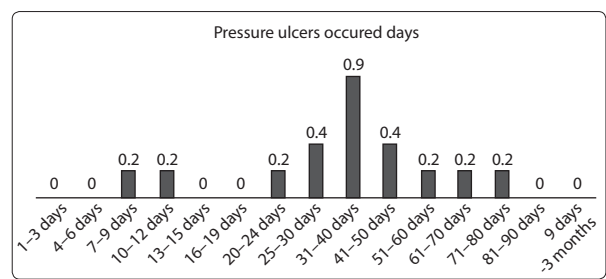


Figure 4. Number of patients with newly developed pressure ulcer, and time interval for development of ulcers.

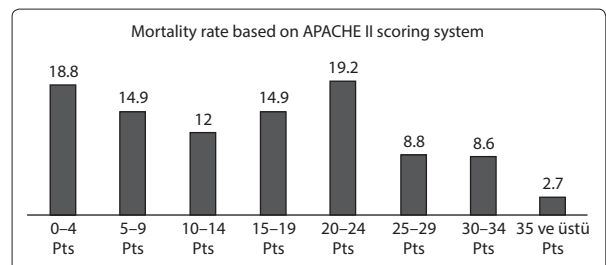


Figure 5. APACHE II scores of patients within 24 hours of admission to intensive care unit.

High APACHE II scores have been found to be strongly correlated with development of pressure ulcer.[2,13] In the present study, at first admission to ICU, APACHE II score was greater than 25 points in 20.2% of patients.

Since incidence rates of pressure ulcers differ based on patient group examined, it is difficult to determine precise overall incidence rate. In a prevalence study performed by Meehan et al., authors reported pressure ulcers in 9% of inpatients and 11.1% of patients hospitalized in ICU. [4] Three (0.7%) patients in the present study had been previously diagnosed as having pressure ulcers. In 14 (3%) patients, pressure ulcers were detected during follow-up in ICU, and in 444 (96.3%), pressure ulcers did not develop. It is the opinion of the authors lower rate of pressure ulcers in present study is related to importance given to primary prophylaxis, nursing care, static, and dynamic supportive systems.

Dansereau and Conwey found in review of 2000 cases that pressure ulcers were localized in ischial (28%), trochanteric (19%), sacral (17%), and other anatomic sites (heels, malleoli, and knees).[14] In present study, pressure ulcers were detected in gluteal (sacral) region (n=13) and heels (n=4).

Although pressure ulcers are considered problem of a chronic disease patient, onset of ulcers generally occurs during acute phase of disease. At first admission of patient, all attention is directed to primary problem, and so risk of ulcer development is frequently overlooked. Nearly 70% of pressure ulcers occur within first 2 weeks of hospitalization.[2] In current study, patients were admitted to ICU for first (n=454 patients; 98.5%), second (n=6; 1.3%), and third (n=1; 0.2%) time. In only 1 of 14 patients who had newly developed pressure ulcers, did disease manifest within first 10 days of ICU stay. Most often, pressure ulcers developed within first 31., and 40. days, usually within the first 31., and 40 days after hospitalization. When patients were admitted to ICU, they were in the mild-moderate (n=242; 53.2%) and high-very high (n=213; 46.8%) risk groups, according to Braden risk assessment scale.

Pressure ulcers can be treated conservatively or surgically. Öztürk et al. treated stage 1 and 2 pressure ulcers by leaving them to secondary healing without any surgical intervention (conservative approach), and performed surgery for stages 3, and 4 pressure ulcers.[15] Patients in present study experienced stage 1 (n=5), 2 (n=10), and 3 (n=1) pressure ulcers. Only the patient who developed stage 3 pressure ulcer underwent surgery; for remaining patients, conservative treatment plan was followed.

In conclusion, development of pressure ulcers is multifac-

torial. Patients admitted to ICU should be evaluated for pressure ulcer during early phase of disease, risk factors should be determined, and prophylactic strategies should be formulated. While focusing on primary cause of disease, monitoring patient is important to prevent pressure ulcers and intervene at an early stage. Necessary measures should be taken to prevent occurrence of pressure ulcers.

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## Yoğun Bakım Hastalarında Bası Yarası Olgularının Retrospektif Olarak Değerlendirilmesi

**Amaç:** Bası yaraları yoğun bakım ünitelerinde (YBÜ) yatan hastalarda görülebilen, oluşumunda malnütriyon, ileri yaş, dolaşım bozukluğu, immobilizasyon, duyuşsal algılamının azalması, enfeksiyon, inkontinans, nörolojik defisit, sedasyon ve sürtünme gibi faktörlerin rol oynadığı bir sağılık sorunudur. Hastada bası yarası oluşması önlenmeli ve oluşan yaralar hızla tedavi edilmelidir. Bu çalışmada, YBÜ'de takip edilen hastalardaki bası yarası olguları değerlendirildi.

**Gereç ve Yöntem:** Yoğun bakım ünitesinde Ocak 2012–Mayıs 2013 tarihleri arasında takip edilen hastaların kayıtları geriye dönük olarak incelendi. Hastaların demografik ve klinik özellikleri, bası yarası oluşma riski, oluşma süresi, derecesi, bası yarası oluşan vücut bölgesi ve sonuçları değerlendirildi.

**Bulgular:** Çalışmaya toplam 461 hasta alındı. Yoğun bakım kabul edilen üç hastada (%0.7) daha önceden bası yarası mevcut iken 14 hastada (%3) yeni bası yarası gelişti, 444 hastada (%96.3) ise bası yarası gelişmedi. Bası yaraları en çok 25–50. günler arası oluştu.

**Sonuç:** Yoğun bakım ünitelerine kabul edilen hastalar bası yarası oluşma yönüyle değerlendirilmeli, riskli olan hastalarda bası yarasının oluşmaması için gerekli önlemler alınmalı ve gelişen bası yaraları etkili bir şekilde tedavi edilmelidir.

**Anahtar Sözcükler:** Bası yarası; Braden risk skoru; yoğun bakım.