AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

(PRESSURE ULCERS) BEDSORES: MODERN APPROACHES TO PREVENTION AND TREATMENT

Khusainov Yusuf Usmonovich
UBS, Doctor of Philosophy in Medical Sciences,
PhD, Associate Professor
yxusainov24@gmail.com
https://doi.org/10.5281/zenodo.20002649

Abstract

Pressure ulcers (bedsores) are localized ischemic and necrotic lesions of the skin and underlying tissues caused by prolonged pressure, friction, and shear forces. This article analyzes the pathogenesis, major risk factors, and clinical stages of pressure ulcers based on current scientific evidence. It also highlights the priority role of preventive measures and reviews modern treatment approaches, including negative pressure wound therapy, bioactive dressings, and regenerative technologies. These approaches play a crucial role in improving the prevention and management outcomes of pressure ulcers.

Introduction

Pressure ulcers are a global health problem, particularly prevalent among patients confined to bed for long periods. They significantly reduce patients' quality of life and place additional burden on the healthcare system. According to the World Health Organization, complications associated with pressure ulcers have a significant impact on disability and mortality.

Etiology and Pathogenesis

The primary cause of pressure ulcers is impaired capillary circulation and tissue ischemia due to prolonged pressure. Furthermore,:

- Friction
- Shear stress
- Maceration

The primary mechanism of pathogenesis is ischemia and subsequent reperfusion injury. This process leads to cell necrosis.

Risk Factors

The following factors are important for the development of pressure ulcers:

- Immobilization (paralysis, coma)
- Neurological diseases
- Diabetes
- Protein-energy malnutrition
- Old age
- Urinary incontinence

Clinical Description of Pressure Ulcers (Expanded, Evidence-Based)

Pressure ulcers (bedsores) are localized lesions of the skin and underlying tissue caused by prolonged pressure, friction, and shear forces. Their clinical manifestations vary depending on the stage of the disease, depth, degree of infection, and the patient's overall condition.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

1. Clinical signs and general symptoms

The first signs of pressure ulcers often go unnoticed. The earliest symptom is persistent redness (erythema) in a specific area of skin that does not subside even after pressure is relieved.

Further clinical signs:

- Skin color change (red, purple, or bluish)
- Local increase or decrease in temperature
- Swelling
- Pain or decreased sensation (if neuropathy is present)
- Blisters or erosions

In severe cases:

- Necrosis (tissue death)
- Purulent discharge
- Unpleasant odor (a sign of infection)

2. Description by clinical stages

Based on classification National Pressure Injury Advisory Panel:

Stage I (initial)

- The skin is intact, but there is redness
- The color does not change when palpated (pressed)
- The patient may feel pain or tenderness
- This stage is reversible

Stage II

- The epidermis and dermis are damaged
- A superficial ulcer or blister appears
- Serous fluid may ooze from the wound
- There is a risk of infection

Stage III

- Tissue necrosis extends to the subcutaneous fat layer
- The wound is deep, crater-like
- A yellow necrotic mass (slough) may be present
- Inflammation is observed in the surrounding tissues

Stage IV

- The most severe stage
- Muscles, tendons, and bones are damaged
- Black necrosis (eschar) is common
- There is a high risk of developing osteomyelitis

3. Additional clinical forms

Unstageable

• The wound surface is covered with necrotic tissue.

• Depth cannot be determined.

Deep tissue injury (DTI)

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

- The skin may be intact
- But there is hemorrhagic damage to the underlying tissues
- Has a bluish or purple tint

4. Localization features

Pressure ulcers typically develop in areas with bony protrusions:

• Coccyx
• Heel
• Greater trochanter of the femur
• Elbow and shoulder areas

These areas experience the highest pressure, and blood circulation is quickly impaired.

5. Features of the clinical course

Pressure ulcers are usually chronic in nature and include the following stages:

1. Ischemic phase
2. Necrotic phase
3. Cleansing (inflammation) phase
4. Granulation phase
5. Epithelialization

These processes correspond to the classical phases of wound healing.

6. Clinical signs associated with complications

In severe cases, the following are observed:

- Local infection → cellulitis
- Development of sepsis
- Osteomyelitis
- Chronic wounds and fistulas

7. Diagnostic criteria

Clinical diagnosis is based on:

• Visual inspection
• Palpation
• Assessment of wound depth
• Detection of signs of infection

If necessary:

• Bacteriological examination
• Radiological methods (to detect osteomyelitis)

Prevention strategies

Prevention is the most effective approach to managing bedsores.

1. Reposition (change of position):

It is recommended to change the patient's position every 2 hours.

2. Special equipment:

• Anti-decubitus mattresses
• Pressure-distributing pillows

3. Skin care:

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

• Skin hygiene
• Moisture control

4. Nutritional support:

• High protein diet
• Micronutrients (zinc, vitamin C)

Modern treatment methods

1. Local wound therapy

• Hydrocolloid and hydrogel dressings
• Antimicrobial coatings (silver ion)

2. Negative pressure wound therapy

Negative Pressure Wound Therapy — creates a vacuum on the wound surface, reducing exudate and stimulating granulation.

3. Biological and regenerative therapy

• Growth factors
• Artificial skin covering materials
• Stem cell therapy (in the experimental stage)

4. Physical therapy methods

• Laser therapy
• Ultrasound therapy

5. Surgical treatment

In severe (stage III–IV) wounds:

• Necrectomy
• Plastic reconstruction (flap surgery)

Complications

• Infection and sepsis
• Osteomyelitis
• Chronic wound syndrome

Discussion

In recent years, an interdisciplinary approach to pressure ulcer treatment has become increasingly important. The use of modern dressings and vacuum therapy techniques in clinical practice reduces wound healing time. However, economic factors and resource availability hinder the widespread implementation of these methods.

Evidence-based and expanded conclusion on pressure ulcers

Pressure ulcers (bedsores) are considered an urgent and multifactorial pathological condition in modern medicine. They develop primarily in patients with prolonged immobilization and are accompanied by ischemic necrosis of the skin and deep tissues. Scientific research shows that this pathology is not only a clinical problem but also a significant economic and social burden on the healthcare system. (PMC)

1. Scientifically based general conclusion

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

The development of pressure ulcers is multifactorial, with the primary pathogenic mechanism being circulatory impairment and tissue hypoxia resulting from prolonged pressure exposure. Friction, shear forces, and moisture are additional damaging factors. (PMC)

The clinical course of the disease progresses gradually (stages I–IV), and in severe cases, damage to muscle and bone tissue is observed. This can lead to serious complications such as infestation, osteomyelitis and sepsis.

2. Clinical and practical significance

According to research:

• Bedsores occur in a significant proportion of inpatients

• In some clinical settings, the prevalence can reach 10–28% (PMC)

• They reduce the patient's quality of life, prolong the duration of treatment, and increase the risk of death

Therefore, bed sores are also considered an indicator of the quality of health care. (PMC)

3. The priority role of prevention

Scientific evidence shows that most cases of bed sores are preventable.

The most effective preventive measures:

• Use of anti-decubitus mattresses (reduces risk by up to 69%) (PMC)

• Regular patient repositioning

• Skin care and moisture management

• Nutritional support

Furthermore, modern research shows that comprehensive (multicomponent) approaches are much more effective than using isolated measures. (PMC)

4. Scientific conclusions on treatment

• Although there are currently many treatment options for pressure ulcers, scientific evidence points to several challenges:

• The effectiveness of many treatments has not been supported by sufficient high-quality studies (PubMed)

• An individualized approach and selection of therapy appropriate to the patient's condition are important

• Modern technologies (negative pressure therapy, bioactive dressings) are promising, but their long-term effectiveness has not yet been fully studied

5. Development trends of modern approaches

Recent scientific directions are focused on:

• Regenerative medicine (growth factors, cell therapy)

• Smart monitoring systems (real-time blood pressure monitoring)

• Artificial intelligence-based diagnostics and classification

These approaches will play an important role in the future in early disease detection and development of individualized treatment strategies.

6. Final scientific conclusion

Bed sores are a preventable disease that can lead to serious complications if not treated properly.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 05. MAY ,2026

Main scientifically based conclusions:

• The disease requires a multifactorial and integrated approach

• Prevention is more effective and cost-effective than treatment

• Modern technologies are increasing the effectiveness of treatment, but there is a need for high-quality clinical studies

• A multidisciplinary approach (doctor, nurse, dietitian) gives the best results

Foydalanilgan adabiyotlar ro‘yxati:

1. Atkinson R.A., Cullum N. Pressure ulcer prevention and treatment evidence review (PubMed)
2. Pressure Ulcer Prevention: Evidence-Based Analysis (PMC)
3. Gaspar S. et al. Systematic review on pressure ulcer prevention (PMC)
4. Huang L. et al. Evidence summary on support surfaces (PMC)
5. Epidemiology and risk factor studies (PMC)
6. World Health Organization. Pressure ulcer prevention guidelines.
7. National Pressure Injury Advisory Panel. Clinical Practice Guideline, 2019.
8. European Pressure Ulcer Advisory Panel (EPUAP) Guidelines.
9. Gefen A. Tissue mechanics in pressure ulcer development.
10. Armstrong DG, Boulton AJM. Advances in wound care management
11. National Pressure Injury Advisory Panel. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline*, 2019.
12. European Pressure Ulcer Advisory Panel. Clinical Guidelines, 2019.
13. World Health Organization. Patient safety and wound care recommendations.
14. Gefen A. (2020). Tissue deformation and pressure ulcer pathophysiology.
15. Coleman S. et al. (2014). Risk factors for pressure ulcer development.
16. Armstrong D.G., Boulton A.J.M. (2017). Advances in wound healing.