

## PRESSURE INJURY IN GERIATRIC SURGERY PATIENTS: SYSTEMATIC REVIEW

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**Abstract.** As patients get older, the frequency of surgery increases and the risk of developing pressure injuries increases. It is very important to prevent pressure injury formation in order to reduce postoperative complications. This study aim to examine research on pressure injury development in geriatric surgical patients. The study is a systematic review study. This systematic review analysed studies published between 2019 and 2023 on Pubmed, Sciencedirect, and Google Scholar databases using the keywords “elderly”, “geriatric surgery”, “pressure injury”, “prevalence”, and “incidence”. As a result of the screening, 7 studies were accepted. The results showed that 71.44% (n=5) of the studies were published in 2020, 14.28% (n=1) in 2021, and 14.28% (n=1) in 2022. No studies on the subject were found in 2019 or 2023. The study found that the average prevalence of pressure injury was 40.6%, with an incidence ranging between 5.15% and 16.37%. It was determined that pressure injury began to form on the third postoperative day, most commonly in the sacrum (35.9-77.19%) and in the heel of the foot (57.6%). It was determined that they were most commonly seen in stage 1. The prevalence and incidence of pressure injury is particularly high in geriatric surgical patients hospitalized in intensive care. It is recommended that nurses examine the factors that contribute to the development of pressure injury in geriatric surgical patients and take measures to prevent them.

**Keywords:** *elderly, geriatric surgery, pressure injury, prevalence, incidence*

### Introduction

Pressure injury represents one of the most serious and life-threatening problems, affecting individuals across all age groups. The problem persists globally due to its high prevalence, the adverse effects it causes, and the burden it places on patients, their families, and the healthcare system (Chaboyer et al., 2017). A study found that the incidence of pressure injuries in hospitalised patients varies between 9% and 18%. The most common group at risk of developing pressure injuries is the elderly (Buh et al., 2021). The functional capacity of cells, tissues and organs decreases in the elderly with the changes that occur with advancing age (Yolcu et al., 2016; Guo and DiPietro, 2010). These changes include a reduction in respiratory volume and capacity, as well as a decrease in partial oxygen pressure (PaO<sub>2</sub>), which is caused by a loss of function in the respiratory system. This, in turn, results in circulatory deficiencies in the skin. Consequently, the process of wound healing is negatively impacted. Additionally, advanced age, poor functional status prior to hospital admission, and poor mental status are also associated with an increased risk of developing pressure injuries (Baumgarten et al., 2009). The following provides an explanation of the poor mental state. Diseases such as dementia, cerebrovascular accident or Alzheimer's disease in elderly individuals may result in impaired sensory perception, agitation or mobilisation disorders, which

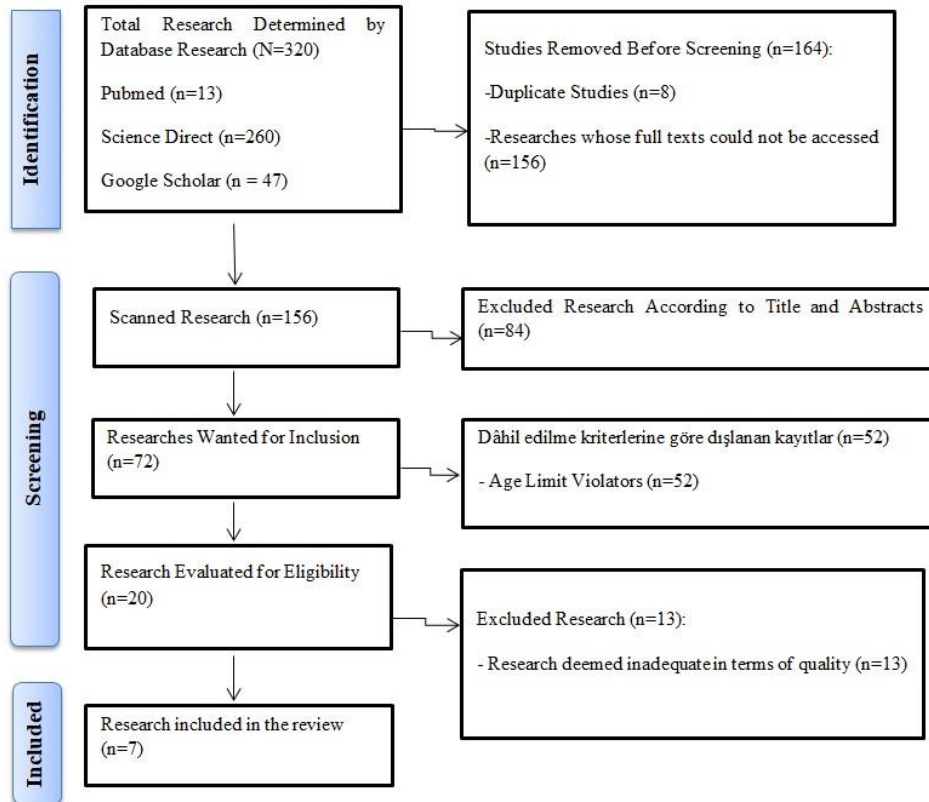
may subsequently lead to the development of pressure injury in elderly individuals (Sezgünsay and Başak, 2019). Furthermore, the presence of at least one chronic disease, diabetes and malnutrition, low haemoglobin levels and excessive blood loss increases the risk of pressure injury (Baumgarten et al., 2009). Additional factors that contribute to the development of pressure injuries in elderly patients and impede the healing process are diminished collagen synthesis, reduced immune response, and compromised protection of the body against microbial pathogens (Sezgünsay and Başak, 2019).

The risk of undergoing surgical intervention increases with age (Williams, 2015). The elderly are more susceptible to adverse outcomes following surgical procedures than younger individuals (Yilmaz, 2016). Complications related to preoperative diseases, loss of mobility due to surgery, decreased efficiency of deep breathing and coughing, and adverse effects of drugs may occur in elderly patients. Furthermore, the effect of anaesthesia persists for a longer period in elderly individuals due to alterations in drug absorption and the effects of ageing (Williams, 2015). Patients who require the use of plaster casts, traction, splints and other medical equipment following surgical procedures, who are subjected to mechanical external forces, who have limitations and become bedridden or wheelchair dependent are at an increased risk of developing pressure injuries (Karadag and Aydin, 2013). The delay of homeostatic control mechanisms for postoperative stress response prolongs the wound healing time and increases the risk of postoperative complications (Yolcu et al., 2016; Guo and DiPietro, 2010). The treatment of pressure injuries is challenging and costly. Such an injury may have a negative impact on the patient's daily life and that of their family, who may be required to assume the role of carer. Furthermore, it can result in financial losses. It may result in social isolation due to a reduction in mobility, an increase in the necessity for rehabilitation, and alterations in body image.8 As the stages of pressure injury progress, the wounds become chronic, and the hospital stay of elderly patients is prolonged (Dworsky et al., 2021; Sezgünsay and Başak, 2019). Furthermore, the mortality rate related to pressure injury in elderly patients has been found to be approximately 68% (Borojeny et al., 2020). The objective of this study was to examine the development of pressure injury in geriatric surgical patients in the context of the existing literature.

## Materials and Methods

The study is a systematic review. The study population comprised studies published between 2019 and 2023, accessed in full text via the PubMed, Sciencedirect and Google Scholar databases, and identified through the application of the following search terms: "elderly", "geriatric surgery", "pressure injury", "prevalence" and "incidence". A total of 320 records were identified as meeting the specified keywords and were published in both Turkish and English. A total of 164 records were excluded prior to screening due to unattainable full texts and the presence of multiple records with identical or near-identical content. A total of 84 records were excluded from further consideration due to discrepancies in their titles and abstracts. A total of 52 studies were excluded from further consideration as they did not meet the age limit of the study. A total of 13 records were excluded due to insufficient quality. Consequently, seven studies that met the stipulated criteria were accepted for analysis. These studies were subjected to the PRISMA 2020 flowchart (*Figure 1*) (Page et al., 2021). An "Analysis Form" was prepared to facilitate joint decision-making by the researchers. Two independent researchers conducted a separate analysis of the studies. The studies to be included in

the analysis were identified and recorded on the appropriate section of the analysis form. The analysis form includes the following information: author(s)/year of publication, purpose, sample, data collection tools, research design and results.



**Figure 1.** PRISMA 2020 Flow diagram.  
Source: Page et al. (2021).

## Results and Discussion

As a result of the literature review, seven studies that met the study criteria were included in the study. It was determined that 71.44% (n=5) of the studies examined in the study were published in 2020, 14.28% (n=1) in 2021 and 14.28% (n=1) in 2022. In 2019 and 2023, no research on the subject was identified. In the study, it was found that the average prevalence of pressure injury was 40.6% and the incidence ranged between 5.15-16.37%. It was determined that the pressure injury started to occur on the third postoperative day, most commonly occurred in the sacrum (35.9-77.19%) and in the foot in the heel (57.6%). The most common stage 1 was found. The characteristics and results of the studies evaluated in the study were explained in detail in *Table 1* as the purpose, sample, data collection tools, research design and results (*Table 1*).

**Table 1. Summary of studies.**

Author/Year	Objective	Sample	Data collection tools	Research design	Result
Lyder and Ayello (2008)	To analyse the risk of pressure sores in inpatients with neurological diseases	140 patients hospitalised in neurology and neurosurgery wards	-Glasgow Coma Scale (GCS), -Hodkinson Mental Test (HMT), -Barthel Index (BI) -Norton Scale (NS)	Cross-sectional	Not using an air mattress, high fever, urinary incontinence and loss of muscle tone are among the factors that increase the risk of pressure ulcer development. Patients with poor cognitive and mental status, low serum haemoglobin levels and longer hospital stays are at higher risk of developing pressure ulcers.
Garcia et al. (2021)	To determine the incidence of new foot pressure injuries after geriatric orthopaedics and vascular surgery and to define the risk factors and characteristics of foot pressure injuries	299 patients (62.2% female, mean age 82.3 years)	-Patients' Descriptive and Clinical Characteristics Form, -EMINA Risk Scale	Observational prospective	The incidence of foot pressure injury is high among elderly patients. Most foot pressure injuries are grade 1 and occur at the heel.
İlkhan and Dag (2023)	Determination of risk factors for pressure sores related to surgery in surgical patients	342 patients hospitalised in general surgery, orthopaedics and cardiovascular surgery clinics who underwent surgery	-Patients' Descriptive and Clinical Characteristics Form, -Operative Pressure Wound Risk Factors Assessment Form, -3S Operating Theatre Pressure Wound Risk Diagnosis Scale and Pressure Wound Staging Form	Descriptive cross-sectional	Advanced age is an important risk factor in the development of postoperative pressure sores. It was found that pressure sores occurred on the 3rd postoperative day, they were mostly in the first stage and the incidence of pressure sores was 16%.
Horup et al. (2020)	Investigation of the results of the use of static coatings versus alternative air mattresses for the prevention of pressure injury	A total of 1557 patients hospitalised in geriatrics and orthopaedics wards Pre-implementation (7 months) (n=720) 873 patients during the test period (6 months)	Employee Satisfaction Survey	Observational	There is no statistical difference in the incidence of pressure injury. Both coating types are effective in preventing the occurrence of pressure injuries. However, static coatings can be difficult to use.
Nadukkandiyl et al. (2020)	Examination of the prevention and management of pressure injury in the elderly	90 patients (mean age 79 years) -Patient group receiving high protein dietary supplements -Group of patients	-Patient Demographic Characteristics Form -Braden Scale -Nutrition Form -Patient Clinical Characteristics Form	A retrospective longitudinal study	45 patients developed pressure injury. The best practices in the treatment of pressure injury were found to be correcting anaemia, giving high protein food supplements and giving the patient a different position every 2 hours.

Zhang et al. (2020)	To determine the cause of functional decline 30 days after a surgical procedure in older adults aged 80 years and over, to examine the risk factors for this decline and to identify ways to minimise it	receiving high protein dietary supplements without ratio pressure Adults aged 80 years and over undergoing inpatient surgery	-Preoperative demographic data records -American Society of Anaesthesiologists Physical Status Classification -Health Research and Quality Clinical Classifications	Retrospective Cohort	Functional decline was present in 406 (20.2%) patients 30 days after the surgical procedure. One of the causes of functional loss was pressure injury. In the postoperative period, patients need help due to the development of pressure injury.
Galivanche et al. (2020)	Prediction of postoperative pressure injury development in geriatric hip fracture patients	8,871 geriatric hip fracture patients	-Patient Demographic Characteristics Form -American Society of Anaesthesiologists Physical Status Classification	Cohort	4457 patients developed postoperative pressure injury. Older patients were found to be more at risk.

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Pressure ulcers are a major health problem with a serious risk of morbidity and mortality (Sönmez, 2003). They are also a preventable condition (Inan and Öztunç, 2012). Preventing the development of pressure ulcers is the most effective solution (Sönmez, 2003). Identifying the risk of pressure ulcers, defining the factors that influence their development accurately and well, and providing evidence-based care are the most important ways to prevent pressure ulcers. The elderly population is increasing in every society in the world. As the population ages, more people are at risk of developing pressure ulcers (Sezgünsay and Başak, 2019). The aim of this study was to determine the risk of pressure ulcer development after surgery in the elderly patient population by examining the prevalence and incidence rates of pressure ulcers in geriatric surgical patients and the factors influencing them in the light of the literature. However, when the literature was analysed, it was found that there were insufficient studies on the development of pressure ulcers in geriatric surgical patients (*Table 1*). Inan and Öztunç (2012) found that the prevalence studies conducted in our country were limited. Kaşıkçı et al. (2018) found that the prevalence of pressure ulcers in their study was 40.6%. They found that the most common pressure ulcer was the first stage (43.6%) and the most common pressure ulcer site was the sacral region (35.9%). In the study conducted by İlkhan and Dag (2023) in Turkey, 42.1% of the patients underwent orthopaedic surgery and 85.09% received general anaesthesia. 21.64% of the patients received vasopressor drugs, 35.38% underwent physical manoeuvres during the operation and 51.75% were kept in the reamination unit for 26-35 minutes after the operation. In elderly patients, the incidence rate of pressure sore development was 16.37% (56/342 patients), the most risky time for pressure sore formation was the 3rd day with 51.79% (29/56 patients), pressure sores occurred mostly in the sacrum with 77.19% (44/56 patients) and all of them were in the first stage.

A study of 299 patients admitted to a geriatric orthopaedic and vascular surgery unit found that patients stayed in hospital for more than 72 hours, 97% of new post-operative pressure ulcers were first-degree (erythema), and the most common sites were the heel (57.6%), lateral malleolus (13.1%), and hallux valgus (11.8%). In order to prevent pressure injuries, it is recommended that more attention be paid to pressure prevention in frail people (Garcia et al., 2021). Pressure ulcers occur as a result of tissue ischaemia due to reduced blood flow in the tissues as a result of intravascular capillary pressure exceeding 32 mmHg (Pacific, 2014). In a study of elderly patients with hip fractures to reduce pressure in the sacral region, polyurethane foam was used and it was found that the incidence of pressure ulcers decreased from 15.4% to 4.5% (Forni et al., 2018). In a study by Lyder and Ayello (2008) of patients admitted to neurology and neurosurgery wards, 30 (21.4%) patients had intracranial masses, 20 (14.3%) had cervical and lumbar disc pathology, 15 (10.7%) had aneurysms, 14 (10%) were hemiplegic and 14 (10%) had spinal masses. They found that patients with poor cognitive and mental status, low serum haemoglobin levels and longer hospital stays were more likely to develop pressure ulcers. We observe that the presence of comorbidities and failure to correct these conditions play a greater role in the development of pressure ulcers than external factors (Horup et al., 2020). Galivanche et al. (2020) in a study of 8,871 geriatric hip fracture patients 30 days after surgery, found that 457 (5.15%) developed a postoperative pressure injury. They found that older patients were more at risk. They concluded that it is very important to intervene more quickly, especially in patients at risk. However, contrary to our study results, İlkhan and Dag (2023) argues in his

master's thesis that age does not make a statistically significant difference in the development of pressure ulcers. Galivanche et al. (2020) identified preoperative risk factors for the development of postoperative pressure ulcers as sepsis, high platelet count, insulin-dependent diabetes, and pre-existing pressure ulcers. Post-operative complications that can lead to post-operative pressure injury were post-operative sepsis, post-operative pneumonia, urinary tract infection and post-operative delirium.

The incidence of malnutrition is higher in older patients, whether they are hospitalised or living at home. This is because deficiencies in vitamins, minerals, fluid and energy make it difficult to maintain tissue integrity (Sezgünsay and Başak, 2019). In the study by Nadukkandiyil et al. (2020) which included a total of 90 patients with a mean age of 79 years, the most common comorbidity was hypertension, followed by diabetes and anaemia, although there were more men. Disruption of tissue integrity is more likely to occur in patients with comorbidities. Hypoalbuminemia was present in 59.3% of patients. At the end of the study, stage 2 pressure injury was more common, followed by stages 3 and 4. The study concluded that the best way to prevent pressure ulcers is to correct anaemia and give high-protein supplements (1.5g/kg) (Nadukkandiyil et al., 2020). The risk of pressure ulcers has been reduced by giving oral enteral nutrition to patients after hip fracture and orthopaedic surgery (Volkert, 2011). The final factor is mobility. It is recommended that patients are repositioned every two hours (Nadukkandiyil et al., 2020). Immobility is one of the most important external factors influencing the development of pressure ulcers (Garcia et al., 2021). Zhang et al. (2020) found that 406 (20.2%) patients had a decline in functional health 30 days after surgery. This represents one in five elderly patients. Functional health refers to the ability of patients to perform activities of daily living. Patients went from being able to move independently to being partially or fully dependent, or from being partially dependent to being fully dependent. Immobility or the need for assistive devices (cane, walking frame, wheelchair) during the discharge period can lead to the development of new pressure injuries or aggravation of existing pressure injuries (Zhang et al., 2020). In conclusion, geriatric patients are at risk of developing a pressure injury after surgery and to prevent the development of a pressure injury, patients' haemoglobin and albumin levels should be maintained at optimal levels, comorbidities should be controlled, early mobilisation and nutrition of the individual should be ensured, malnutrition should be avoided, patients should be protected from infection, and the cognitive and mental status of patients should be improved.

## Conclusion

The prevalence and incidence of pressure injury is high especially in geriatric surgical patients hospitalised in intensive care unit. However, the number of studies on pressure development after geriatric surgery was found to be insufficient and more studies are needed. It is recommended that nurses should examine the factors affecting the development of pressure injury in geriatric surgical patients, take measures to prevent the development of pressure injury, establish and implement evidence-based pressure injury preventive care standards.

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## Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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