

ORIGINAL ARTICLE

Nutritional management of older hospitalised patients with pressure injuries

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This cross-sectional, multicentre study was conducted in hospitals to investigate nutritional interventions conducted in patients aged 70 years or older with (risk of) pressure injuries. A total of 1412 patients from 33 hospitals with 208 wards participated in the study. A standardised questionnaire was used to collect demographic data and data on care dependency, malnutrition risk, risk for/prevalence of pressure injuries, and nutritional interventions. Data analyses were conducted by using descriptive statistics, chi-square tests, or independent t-tests. According to the Braden Scale, 678 (48.0%) of the patients were at risk of developing pressure injuries, and 71 patients (5.0%) had at least one pressure injury (assessed by skin inspection). The most frequently conducted nutritional interventions in patients with pressure injuries were providing support during mealtimes (50.7%), food specifically desired by the patient (40.8%), and conducting a malnutrition screening (39.4%). One quarter of the patients with pressure injuries were referred to a dietitian. The provision of an energy-enriched/protein-enriched diet (18.3%), energy-enriched/protein-enriched snacks (12.7%), or oral nutritional supplements (8.5%) was rare. Nutritional care in older patients with risk of pressure injuries is suboptimal. Health care professionals need to raise awareness regarding the importance of nutrition in the management of patients with pressure injuries.

KEYWORDS

hospital, malnutrition, nutrition therapy, pressure injury, pressure ulcer

1 | INTRODUCTION

Recently, the National Pressure Ulcer Advisory Panel (NPUAP) altered the terminology of pressure ulcers to pressure injuries and revised the definition as well as the staging system.¹ According to the NPUAP, pressure injuries are now defined as “localized damage to the skin and underlying soft tissue over a bony prominence or related to a medical or other device”.¹ Pressure injuries refer to intact skin as well as open ulcers and are the result of pressure or pressure combined with shear forces. The development of pressure injuries is also influenced by other factors, such as microclimate, perfusion, comorbid conditions, soft tissue conditions, and nutrition.¹

Pressure injuries represent a serious and complex health problem in older persons.^{2–4} As a result of geriatric syndromes such as incontinence, reduced mobility, or malnutrition, older persons in hospitals are at increased risk of developing a pressure injury.² The prevalence of pressure injuries in the acute care setting is between 6% and 18.5%, depending on the underlying methodology used to measure these rates.^{5–8} The prevalence rates increase as age increases and reach up to 25% in persons 70 years of age and older.²

Numerous negative consequences of pressure injuries are described in the literature, including pain, diminished quality of life, increased mortality, longer length of hospital stays,

and higher readmission rates.^{8–13} Furthermore, these injuries add an economic burden to health care systems. Studies show that hospital costs in patients with pressure injuries are more than twice that of patients without pressure injuries.¹¹ Dealey et al showed that the treatment costs for one pressure injury in the UK can be up to 14 000 pounds, depending on the severity of the pressure injury.¹⁴

It is well known that nutrition and hydration play important roles in preserving skin and tissue viability.¹⁵ The proteins that make up collagen, for example, support wound healing by contributing to the synthesis of enzymes and connective tissue and playing roles in cell multiplication. They are considered as vital nutrients in the prevention and treatment of pressure injuries.¹⁵ However, a sufficient amount of energy must be provided along with these proteins, otherwise, the liver and kidneys may begin to synthesise glucose from amino acids.¹⁵ In this case, the body is not able to use the proteins for wound healing.¹⁵ A systematic review of observational studies showed that patients with pressure injuries have, on the one hand, an increased resting metabolic rate but, on the other hand, reduced intakes of energy and protein, e.g., as a result of the increased inflammatory response or anorexia. This imbalance leads to deterioration in the patient's nutritional status and, consequently, to delayed wound healing.¹⁶

The recent literature shows that adequate nutritional interventions are effective in prevention and treatment of pressure injuries.^{15,17,18} Therefore, evidence-based guidelines consider nutrition and hydration, as well as mobilisation and wound management, as major key factors in the prevention and treatment of pressure injuries in adults.^{19–22} These guidelines and a “White Paper” published by the NPUAP cover specific recommendations for nutritional interventions in patients with (a risk of developing) pressure injuries.¹⁵

The main recommendations in clinical guidelines refer to the inclusion of malnutrition screening and malnutrition assessment in the patient treatment plan, referral to a dietitian (or nutrition expert), while detailed recommendations refer to the intake of nutrients.^{19,20,22,23} If patients with (or at risk of) pressure injuries are at risk of malnutrition or malnourished, an energy intake of 30 to 35 kcal/kg body weight is recommended.^{15,22} Furthermore, patients with (risk of) pressure injuries should eat adequate amounts of protein. If they are (at risk of being) malnourished, a protein intake of 1.25 to 1.5 g/kg body weight is recommended.^{15,22} The provision of special amino acids, such as L-arginine, and other nutrients, such as zinc or antioxidants, seems to improve the healing of pressure injuries even more.¹⁷ The provision of high-calorie and high-protein nutritional supplements is highly recommended,²² and the intake of an adequate amount of fluid should be encouraged, taking the comorbidities of the patients into account.^{19,22}

Key Messages

- this cross-sectional study with 1412 hospitalised patients aged 70 years or older investigates nutritional interventions conducted to prevent and treat pressure injuries
- the results show that nutritional care in older patients with (risk of) pressure injuries is suboptimal in hospitals and not in line with guideline recommendations
- few older hospitalised patients with (risk of) pressure injuries are screened for malnutrition, are referred to a registered dietitian, and receive energy/protein-enriched food, enriched snacks, or oral nutritional supplements
- an improvement in the nutritional care of these patients is crucial

At present, evidence-based guidelines regarding nutrition in pressure injury patients are available^{19,20,22} and offer recommendations for clinical practice. However, little is known about the current practice of nutritional care in hospitalised older patients with pressure injuries, in terms of what is actually being carried out. One Australian study assessed practices related to nutritional care in hospitalised patients at risk of developing pressure injuries and showed that only 13.6% received a high-energy/high-protein diet, while 29% of the patients were referred to a dietitian.²⁴ No international studies about the nutritional practices of older hospitalised patients have been recently conducted.

Therefore, the main objective of this study was to describe the nutritional interventions conducted in Austrian hospitalised patients, who were 70 years of age or older and had (a risk of developing) pressure injuries. The secondary objectives of the study were to assess the prevalence of pressure injuries and the association between pressure injuries and nutritional status in this patient group of older hospitalised adults.

2 | METHODS

2.1 | Design and participants

A cross-sectional, multicentre study (*Nursing Quality Measurement 2.0*) was conducted on November 14, 2017. We invited all Austrian hospitals ($n = 236$) with 50 beds or more to participate in the study. If a hospital agreed to participate, either with all or selected wards, all patients in the respective wards were informed about the study and asked for participation. If they agreed, the patients or their legal representatives had to provide their written informed consent. The local ethics committee approved the study, and the research team adhered to the Code of Ethics issued by the World Medical Association.

2.2 | Measurement

We used a standardised and tested questionnaire for data collection.^{25,26} Two nurses collected the data either at the bedside of each patient and with reference to the respective patient record. One nurse belonged to the ward where the data collection took place, and one nurse, to another ward. If the two nurses disagreed about the answer to a question, the opinion of the external nurse was prioritised, because it was assumed to be more objective. The nurses entered all data into a secure, web-based data entry program.²⁵ Prior to taking the measurements, the research team provided training sessions about the standardised data collection, the content of the questionnaire, the use of the questionnaire, and the data entry program.

We collected demographic data and data on six nursing care problems (pressure injuries, malnutrition, falls, incontinence, restraints, and pain), but for this aspect of the study, only data on the prevalence and nutritional treatment of pressure injuries in patients 70 years of age or older were considered. The nutritional interventions for pressure ulcer management were derived from international guidelines.^{19,20,22} Patients at the end of life were excluded, because nutritional interventions should focus on the maintenance of quality of life during this phase and not on the prevention or treatment of pressure injuries.²⁷

2.3 | Instruments

The level of care dependency of the patients was measured using the *Care Dependency Scale* (CDS). This tool consists of fifteen items (e.g. getting [un]dressed, eating and drinking or mobility), and sum scores can range between 15 and 75, whereby fewer points mean higher levels of care dependency.^{28,29} A score from 15 to 44 indicates high levels of care dependency; 45 to 59, medium levels of dependency; and 60 to 75, low levels of dependency.²⁸ The medical diagnoses were assessed based on the *International Classification of Diseases (ICD-10)*,³⁰ and the malnutrition risk, according to the *Malnutrition Universal Screening Tool* (MUST).³¹ The MUST is a screening tool that includes three questions: body mass index (BMI), weight loss, and acute disease/nutritional intake. A maximum score of 6 can be achieved, and patients are categorised as being at low risk (0 points), medium risk (1 point), or high risk (2 or more points). For the purposes of this research, patients at medium or high risk were considered as patients at risk of malnutrition. The pressure injury risk was evaluated using the *Braden Scale*,³² which is comprised of six items (sensory perception, moisture, activity, mobility, nutrition, and friction and shear). The cutoff value for being at risk of developing pressure injuries is ≤ 20 on the Braden Scale.³³

The prevalence of pressure injuries was determined by two nurses, who performed skin inspections on the day the measurements were taken. The pressure injuries were categorised based on the NPUAP categories.²² Prevalence rates were calculated for all pressure injuries as well as for pressure injuries from category two or higher. Nutritional interventions, for example, conducting malnutrition screening, providing energy/protein-enriched food or snacks, providing oral nutritional supplements (ONS), or referring patients to a dietitian were assessed by asking the patients and the responsible nurses and by looking over the patient records. Nutritional interventions were evaluated in all patients with pressure injuries, regardless of the category.

2.4 | Data analysis

Data were analysed using the SPSS 23.0 statistical software for Windows.³⁴ Two researchers checked the data to identify missing or invalid values and removed them from the data file. Descriptive statistics were carried out on the nominal and ordinal variables, and metric variables are given as means and standard deviations. The associations between the patient characteristics in patients with and without pressure injuries or patients with risk of pressure injuries and the existence of pressure injuries were calculated using chi-square-tests or independent t-tests. The significance level was set at 0.05.

3 | RESULTS

3.1 | Sample characteristics

Thirty-three hospitals with a total of 208 wards agreed to participate in this study. Of the 2955 patients who gave their informed consent, 1476 were 70 years or older. Of these 1476 patients, 64 were in an end-of-life stage and, therefore, were excluded from the patient group. Therefore, 1412 hospitalised adults aged 70 years or older were included in this study.

Table 1 shows the patient characteristics, which allowed comparisons to be made between patients with pressure injuries, patients without pressure injuries and the total patient group, as well as the P-values, which indicated the strength of the association between the presence of a pressure injury and the patient characteristics. 55.2% of the included patients were female. Their mean age was 79.5 (\pm 6.5) years, and the average number of medical diagnoses per patient was 3.3. 14.5% of the total patient sample was highly dependent on nursing care, based on a CDS score of 15 to 45. The three most common diagnoses were circulatory, respiratory, and musculoskeletal diseases. Patients with pressure injuries had a significantly higher number of ICD-10 diseases ($P < 0.001$), were more dependent on nursing care

TABLE 1 Patient characteristics for hospitalised patients with and without pressure injuries and for the total sample^a

Characteristics	Total (n = 1412)	Patients with PI (n = 71)	Patients without PI (n = 1341)	P-value
Female	780 (55.2)	46 (64.8)	734 (54.7)	0.097
Age (y)	79.5 (±6.5)	80.7 (±7.1)	79.4 (±6.5)	0.130
Number of ICD-10 diagnosis	3.3 (±1.8)	4.1 (±2.2)	3.3 (±1.8)	<0.001
Patients with high care dependency, CDS 15 to 44 ^b	205 (14.5)	34 (47.9)	171 (12.8)	<0.001
CDS sum score (15-75)	62.6 (±15.8)	44 (±16.6)	63.6 (±15.2)	<0.001
BMI, kg/m ²	26.2 (±5.0)	25.7 (±6.3)	26.1 (±4.9)	0.441
Patients with malnutrition risk, MUST	288 (24.0)	18 (36.0)	270 (23.4)	0.042
Five most frequent ICD-10 diagnoses				
Circulatory diseases	882 (62.5)	48 (67.6)	834 (62.2)	0.079
Respiratory diseases	393 (27.8)	22 (31.0)	371 (27.7)	0.543
Musculoskeletal diseases	389 (27.5)	26 (36.6)	363 (27.1)	0.079
Digestive diseases	380 (26.9)	24 (33.8)	356 (26.5)	0.179
Genitourinary diseases	377 (26.7)	27 (38.0)	350 (25.1)	0.027

BMI, body mass index; CDS, Care Dependency Scale; MUST, Malnutrition Universal Screening Tool; and PI, pressure injury.

^a Values presented are n (%) for categorical data and mean (±SD) for metric data.

^b 15 to 44 means high levels of care dependency, 45 to 59 means medium levels of care dependency and 60 to 75 means low levels of care dependency.

($P < 0.001$), had a higher risk of malnutrition ($P = 0.042$), and suffered from genitourinary diseases more frequently ($P = 0.027$) than patients without pressure injuries.

3.2 | Nutritional interventions

As shown in Table 2, the most frequently conducted nutritional interventions in patients at risk of developing pressure injuries as well as those with existing pressure injuries were providing food specifically desired by the patient (42.9% and 40.8%), conducting a malnutrition screening (41.2% and 39.4%), and supporting patients during mealtimes to ensure adequate nutritional intake (30.0% and 50.7%). The three most infrequently conducted interventions were providing

parenteral nutrition (3.0% and 4.2%), enteral nutrition (4.6% and 2.8%), and ONS (5.1% and 8.5%).

3.3 | Prevalence of pressure injuries

According to the *Braden Scale*, 609 (43.1%) of the patients were at risk of developing pressure injuries. On the day of measurement, the skin inspections showed that 71 persons (5.0%) had at least one pressure injury. The total number of wounds on these patients was 95. A pressure injury of category 2 or higher was found on 48 (3.4%) patients. Hospital-acquired pressure injuries were found in 1.7% of the patients. The localisation of the pressure injuries was mostly at the base of the spine (50.5%) or on the heels (28.4%).

TABLE 2 Nutritional interventions to prevent and treat pressure injuries in older hospitalised patients (70+)

Intervention	Patients with risk of PI (n = 609)	Patients with PI (n = 71)	Patients without PI or risk of PI	P-value
Food specifically desired by the patient	261 (42.9)	29 (40.8)	313 (42.8)	0.948
Malnutrition screening	251 (41.2)	28 (39.4)	275 (37.6)	0.395
Support at mealtimes	183 (30.0)	36 (50.7)	12 (1.6)	<0.001
Adjustment of meal consistency	116 (19.0)	23 (32.4)	33 (4.5)	<0.001
Dietitian referral	110 (18.1)	20 (28.2)	91 (12.4)	<0.001
Information for patients and relatives reg. Nutritional problems and measures	104 (17.1)	21 (29.6)	64 (8.7)	<0.001
Fluid list	103 (16.9)	13 (18.3)	13 (1.8)	<0.001
Food protocol	79 (13.0)	14 (19.7)	11 (1.5)	<0.001
No nutritional interventions	77 (12.6)	7 (9.9)	183 (25)	<0.001
Energy/protein-enriched diet	70 (11.5)	13 (18.3)	22 (3.0)	<0.001
Energy and/or protein-enriched snacks	69 (11.3)	9 (12.7)	38 (5.2)	<0.001
Other nutritional interventions	42 (6.9)	7 (9.9)	31 (4.2)	0.032
ONS	31 (5.1)	6 (8.5)	21 (2.9)	0.021
Enteral nutrition	28 (4.6)	2 (2.8)	25 (3.4)	0.479
Parenteral nutrition	18 (3.0)	3 (4.2)	4 (0.5)	0.001

ONS, oral nutritional supplements; and PI, pressure injury.

3.4 | Association between pressure injuries and nutritional status

A significant association was found between the presence of pressure injuries and the risk of malnutrition (see Table 1). Eighteen (36%) patients with pressure injuries and 270 (23.4%) of the patients without pressure injuries were at risk of malnutrition according to the MUST ($P = 0.042$).

4 | DISCUSSION

Five percent of hospitalised patients 70 years or older had a visible pressure injury on the day of measurement. Factors significantly associated with pressure injuries in our patient sample were a higher number of ICD-10 diagnoses, a higher level of care dependency, a higher risk of malnutrition, and the presence of genitourinary diseases. The frequency of some nutritional interventions used differed significantly between patients who were at risk of developing pressure injuries and patients with existing pressure injuries. Nutritional interventions, as recommended by clinical guidelines,^{19,20,22} are rarely provided to patients with (a risk of developing) pressure injuries, and the provision of nutritional support in the form of ONS is especially rare.

This study showed a low prevalence of pressure injuries in Austrian hospitals as compared with the prevalence of these injuries measured in other countries. Studies that assessed the prevalence of pressure injuries in similar European countries showed higher prevalence rates of up to 22%.^{2,6} An analysis of data collected in the US also shows higher prevalence rates of up to 20%.⁷ A systematic review published in 2017, which included nineteen papers, stated that the measured prevalence rates varied from 6% to 18.5% in the hospital setting.⁵ The relatively low prevalence of pressure injuries found in this study may be the result of the fact that a special focus has been placed on addressing this care problem in the Austrian healthcare system. Efforts have been made over the last few decades to reduce pressure injury (PI) prevalence in Austrian healthcare institutions.²⁵ Nearly all of the hospitals have guidelines for the prevention and treatment of PI, as well as multidisciplinary expert committees that provide advice on the treatment of patients with PI. The presence of these structural quality indicators may contribute to the low prevalence of pressure injuries seen in Austrian hospitals.²⁵

Our results indicated that patients with existing pressure injuries receive more nutritional interventions than patients at risk of developing pressure injuries. Patients with pressure injuries receive support during mealtimes, the meal consistency is adjusted and dietitians are involved significantly more frequently. In addition, nurses provide patients and relatives with more information about nutritional problems and measures. If patients at risk of developing pressure injuries have a concurrent risk of becoming malnourished, these

patients seem to receive interventions slightly more often. These results show that the treatment of pressure injuries using nutritional interventions is more common than prevention. However, it is known that placing a special focus on pressure injury prevention would be economically advantageous. The expected effectiveness of treatment provided prior to the development of pressure injuries would also be higher than that provided afterwards.³⁵ Therefore, the prevention of pressure injuries using nutritional interventions, amongst other measures, should be assigned priority in hospitals.¹⁵

To find out who may benefit the most from (preventive) nutritional interventions, it is necessary to apply a valid and reliable malnutrition screening tool.³⁶ The clinical guidelines that refer to pressure injuries recommend malnutrition screening in every patient who is at risk of developing pressure injuries.^{19,22} In our sample, only 41.2% of the patients were considered to be at risk of developing pressure injuries, and 39.4% of the patients with pressure injuries were screened for malnutrition. Another study conducted in an Australian hospital setting showed a higher, but still unsatisfactory, malnutrition screening rate of 59% in patients at risk of developing pressure injuries.²⁴ In the general Austrian hospital population, the malnutrition screening rate is even lower (i.e., about 24%).³⁷ This shows that health personnel have a higher awareness of nutritional problems in patients at risk of developing pressure injuries, but the 100% screening rate has still not been attained. This is alarming, because the use of a malnutrition screening tool improves the nutritional practices of healthcare professionals,³⁷ leading to more dietitian referrals³⁸ and, thus, showing that their use improves the quality of nutritional care.

The strongest evidence regarding nutritional interventions in patients (at risk of developing) pressure injuries is available for the provision of high-energy/high-protein ONS, which may be fortified with L-arginine, zinc, or antioxidants. The results of studies show that the adequate intake of these nutrients results in improved pressure injury-healing rates.^{39–44} Therefore, the NPUAP guideline strongly recommends offering fortified foods and/or high-calorie and high-protein ONS between meals if the patient's nutritional requirements cannot be met by their dietary intake.²² Despite these recommendations, only 5.1% of pressure injury at-risk patients and 8.5% of patients with existing pressure injuries were shown in our study to receive ONS. Energy-enriched/protein-enriched foods or snacks were more frequently provided than ONS (see Table 2), but still to a very low extent. This fact may increase the risk that the patient develops a pressure injury. For those patients with an existing pressure injury, this means that wound healing is slowed. This has major effects on the patients. It is well known that pressure injuries cause pain, a low quality of life, and increase mortality, but they also burden the healthcare system by adding to the costs of health care.^{9,14}

Another important intervention that is recommended by guidelines is the referral of patients with (a risk of developing) pressure injuries to a registered dietitian.²² Dietitians are the officially recognised experts for clinical nutrition and, therefore, are responsible for additional nutritional assessment, developing an individualised nutritional care plan and monitoring/supervising nutritional therapy.^{15,45} All health care professionals on the multidisciplinary team should help carry out the implementation of interventions. However, in this study, only 18.1% of the patients at risk of developing pressure injuries were referred to a dietitian and only 28.2% of the patients with an existing pressure injury. These results are similar to those cited in another study, in which 29% of patients at risk of developing pressure injuries were referred to a dietitian.²⁴ These results clearly show that dietitians are still rarely included in the management of pressure injury patients.

4.1 | Strengths and limitations

The results of this study are of major importance in that few studies have been conducted to investigate to what extent nutritional interventions are included in the management of the prevention and treatment of pressure injuries in hospitalised older adults.²⁴ The fact that a large sample size (i.e., 1412 older hospitalised patients) was included was used strengthens the results. However, the study had certain limitations. A selection bias may exist because the hospitals could voluntarily participate in the study. It may be that only hospitals with a high interest in the topic of nutrition and pressure injuries participated. This limits the generalisation of the results. Furthermore, all patients had to fill out a written informed consent form. Some patients refused to participate, and the nurses who collected data reported that most patients had very poor overall health status. This may have led to an underestimate of the prevalence of pressure injuries and malnutrition in this study. Because of the difference in group sizes, the associations have to be treated with caution. Moreover, the cross-sectional design of the study does not allow drawing causal relationships.

5 | CONCLUSIONS

The results of this study show that nutritional care in older patients with (a risk of developing) pressure injuries is sub-optimal. Evidence-based guidelines clearly state which interventions should be performed, but only a minority of patients receive these interventions (e.g., malnutrition screening, referral to a dietitian, energy-enriched/protein-enriched snacks/food or ONS) in clinical practice. We strongly recommend the inclusion of nutritional interventions in accordance with guideline recommendations in the management of each patient who is at risk of developing pressure injuries or who has existing pressure injuries,

especially if nutritional deficiencies are present. Both health care professionals and stakeholders must invest efforts to raise awareness about the importance of nutrition in the management of pressure injuries. Future studies need to be carried out to strengthen the evidence with respect to nutritional interventions in affected patients. A special focus should be placed on conducting intervention studies to explore different nutritional interventions, such as dietary counselling or the provision of enriched foods and snacks to improve patient outcomes and well-being.

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