

# Psychometric properties of the Pressure Ulcer Knowledge Test (PZ-PUKT) among nurses

## *Właściwości psychometryczne testu wiedzy o odleżynach (PZ-PUKT) wśród pielęgniarek*

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**Słowa kluczowe:** pielęgniarstwo, walidacja skali, właściwości psychometryczne, odleżyny, PZ-PUKT.

### Abstract

**Introduction:** Pressure ulcers pose a significant challenge to the healthcare system. Nurses can contribute to reducing the frequency of pressure ulcers if they possess up-to-date knowledge in this area. The use of a reliable research tool to assess nurses' knowledge of pressure ulcer prevention and treatment provides opportunities to identify knowledge deficits in this area, leading to the implementation of evaluative actions.

**Aim of the research:** Evaluation of the psychometric properties of the Pressure Ulcer Knowledge Test (PZ-PUKT) in a group of nurses.

**Material and methods:** The study included 82 nurses practicing in primary healthcare settings during postgraduate training sessions. The PZ-PUKT, developed by Pieper and Zulkowski in the 2021 version, was utilised. The test was translated into Polish by 2 independent translators and subsequently evaluated for content validity based on Polish and international guidelines (the Polish Wound Management Society (PTLR) and the National Pressure Injury Advisory Panel (NPIAP)).

**Results:** The level of knowledge among the participants was assessed as above average, with the accuracy of responses in the test exceeding 60%. The psychometric properties of the PZ-PUKT test were determined, and an analysis of item and internal consistency was conducted (Cronbach's  $\alpha = 0.726$ ).

**Conclusions:** The PZ-PUKT questionnaire meets the basic norms regarding the consistency and quality of question construction. It is recommended that the PZ-PUKT questionnaire be used for assessing the knowledge of nursing students and practicing nurses.

### Streszczenie

**Wprowadzenie:** Odleżyny stanowią poważny problem dla systemu ochrony zdrowia. Pielęgniarki mogą przyczynić się do zmniejszenia częstości występowania odleżyn, jeżeli posiadają aktualną wiedzę w tym zakresie. Wykorzystanie wiarygodnego narzędzia badawczego oceniającego stan wiedzy pielęgniarek w zakresie profilaktyki i leczenia odleżyn daje możliwość identyfikacji deficytów wiedzy w tym obszarze z następczym wdrożeniem działań ewaluacyjnych.

**Cel pracy:** Ocena właściwości psychometrycznych testu wiedzy o odleżynach (PZ-PUKT) w grupie pielęgniarek.

**Materiał i metody:** Badaniem objęto 82 pielęgniarki prowadzące działalność własną w podstawowej opiece zdrowotnej w trakcie odbywania szkoleń podyplomowych. Wykorzystano PZ-PUKT opracowany przez Pieper i Zulkowski w wersji z 2021 roku, który został przetłumaczony na język polski przez dwóch niezależnych tłumaczy, następnie sprawdzony pod względem merytorycznym z użyciem wytycznych polskich i światowych (Polskie Towarzystwo Leczenia Ran – PTLR, i Krajowy Panel Doradczy ds. Odleżyn – NPIAP).

**Wyniki:** Poziom wiedzy badanych oceniono powyżej przeciętnej, poprawność udzielonych odpowiedzi w teście przekraczała 60%. Określono właściwości psychometryczne testu PZ-PUKT oraz dokonano analizy pozycji i spójności wewnętrznej ( $\alpha$  Cronbacha = 0,726).

**Wnioski:** Kwestionariusz PZ-PUKT spełnia podstawowe normy w zakresie spójności i jakości konstrukcji pytań. Rekomenduje się wykorzystanie kwestionariusza PZ-PUKT do oceny wiedzy studentów kierunku pielęgniarstwo i pracujących pielęgniarzek.

## Introduction

Pressure ulcers pose a significant medical and social problem despite the increasing number of studies focusing on their aetiology, pathogenesis, and methods of prevention and treatment. Evidence is still sought to determine the risk factors for the development and progression of pressure ulcers in various patient groups, as well as effective and cost-effective methods of prevention and treatment [1]. Implementing preventive measures effectively reduces the risk of developing deep pressure ulcers in many cases. However, despite guidelines and recommendations regarding care, the prevalence rate of pressure ulcers remains high in Europe and North America (7.6–26.0%). It is estimated that in the United States, pressure ulcers affect over 2.5 million patients receiving care [2]. Patients are at risk of developing pressure ulcers both in hospital and at home. According to Kottner *et al.* [3], the occurrence of pressure ulcers may affect over 70% of patients with self-care dysfunction. In Poland, nationwide multicentre epidemiological studies have not been conducted to accurately indicate the coefficients and statistical data concerning the epidemiology and effectiveness of treatment. Regional single studies indicate similar results to those presented in Anglo-American literature. It is estimated that in hospital wards, this problem may affect between 3 and 17%, and in long-term care, between 17% and 28% [4]. Treating pressure ulcers after preventive measures becomes an equally serious problem in modern healthcare due to such high rates and the long period of time required for wound closure.

Pressure ulcers cause pain, discomfort, and reduced quality of life for patients, and they are associated with prolonged hospital stays and high healthcare costs. They can also pose a threat to the patient's life [5, 6]. The priority in caring for patients at risk of pressure ulcers should be preventive measures, for which nurses are responsible [7]. A meta-analysis conducted by Dalvand *et al.* [8] indicates that nurses' knowledge of pressure ulcer prevention is insufficient and often based on intuition and habit rather than evidence-based methods. Nurses' knowledge and skills are recognised as factors shaping their positive attitudes towards wound prevention and treatment [8–12].

Considering the importance of knowledge about pressure ulcers, a reliable tool for its assessment is essential. Objective assessment of nurses' knowledge should be used to design educational programs and plan training sessions [13–18]. So far, there has been

no standardised tool available in Polish settings for assessing nurses' knowledge of pressure ulcer prevention and treatment. Several tools for assessing knowledge about pressure ulcers are available in the literature, such as the Pressure Ulcer Knowledge Assessment Tool (PUKAT) developed by Beeckman *et al.* [18] or the Pressure Ulcer Knowledge Test (PZ-PUKT) developed by Barbara Pieper and Karen Zulkowski in 2014 and modified in 2021 [19]. The validity, reliability, and internal consistency of the PZ-PUKT have been verified and confirmed in various studies [20–22].

## Aim of the research

Evaluation of the psychometric properties of the PZ-PUKT in a group of nurses.

## Material and methods

### Ethical considerations

The guidelines of the Helsinki Declaration were introduced during the conducted study. Participants were informed about the purpose of the study and provided informed consent before starting the study, and they could withdraw at any point without giving a reason [23]. Permission to conduct the cultural adaptation process and psychometric studies of the PZ-PUKT was obtained from the authors, Barbara Pieper of the College of Nursing at Wayne State University de Detroit, Michigan, and Karen Zulkowski of the College of Nursing at Montana State University, Bozeman, Montana, in the United States.

### Course of the study

The study was conducted in 2 stages. In the first stage, the tool along with its description was translated into Polish by 2 independent translators. Subsequently, a 5-member expert panel consisting of 2 physicians and 3 nurses specialising in wound prevention and treatment was formed. The panel compared the translations and verified the consistency and correctness of the translation of individual questions. In assessing the correctness of the translation of questions, the guidelines of the Polish Wound Management Society (PTLR) [1] and the National Pressure Injury Advisory Panel (NPIAP) [3] registered in the United States were taken into account. Subsequently, cultural adaptations were made to better express certain items. No controversial or inconsistent content with the recommendations was noted in the pre-

pared tool. The study was conducted with a group of 82 nurses during their specialised training, organised by the Postgraduate Nursing and Midwifery Education Centre (Polish OKPPiP) in Rzeszów, Poland. The following criteria were assumed for selecting the study group: a minimum of 1 year of professional experience, competence in wound treatment, and interest in the issue and the studied area. Participants received instructions for completing the questionnaire along with the Polish version of the PZ-PUKT, and each person could withdraw from the study at any time. The time allocated for responses was 60 min, although the majority of participants completed the assessment within an average time not exceeding 20 min. Prior to the study, participants were asked to adhere to the rules applicable to examinations to ensure the reliability and validity of the results.

### Research methods and tool

The method of estimation and a diagnostic survey was utilised in constructing the methodological assumptions. The research instrument consisted of a standardised test on pressure ulcers knowledge: the Pieper-Zulkowski PZ-PUKT, developed at the University of South Australia, 2021 version [19, 20]. Permission was obtained from the authors of the PZ-PUKT to prepare the Polish-language version. The tool comprises 72 items and assesses knowledge in 3 subscales: prevention (31 statements), stages of pressure ulcers (21 statements), and wound description (20 statements). Each item has 3 response options (*true*, *false*, and *don't know*), and participants receive 1 point for each correct answer and 0 points for an incorrect answer. Out of the 72 statements regarding pressure ulcers, 42 statements are true, and 30 are identified as false. The total score of the test ranges from 0 to 72 points [19, 20].

### Statistical analysis

Analysis was conducted using IBM SPSS Statistics v21. The Kolmogorov-Smirnov test was employed to assess the normality of distributions. Cronbach's  $\alpha$  coefficient was utilised to evaluate the reliability of the scale. Spearman's  $\rho$  correlation coefficient was used to assess relationships between variables, and non-parametric tests for significance differences in distributions included the Mann-Whitney  $U$  test and the Kruskal-Wallis test.

### Difficulty and discrimination indices

Two indices were also utilised to evaluate the quality of scale items: the difficulty index (DIFF) and the discrimination index (DISCR). The difficulty index for each item is calculated as the percentage of participants who answered the question correctly, i.e. the ratio of individuals who answered the question

correctly to the total number of respondents. The discrimination index indicates the extent to which a given question differentiates individuals achieving high and low scores on the scale. To calculate the discrimination index from the study sample, the approach of Moharramzadeh *et al.* [20] was adopted. A subset comprising 27% of individuals with the highest scores on the scale and 27% with the lowest scores on the scale was extracted, and then the discrimination index was calculated as the difference in the percentage of correct answers between the 2 groups.

In Table 1, the difficulty and discrimination indices of the questions are presented. A difficulty coefficient below 0.30 is considered too difficult; above 0.70 is considered easy; and optimal values should fall within the range 0.30 to 0.70. Discrimination values below 0.10 indicate that the question is of low quality and should be discarded or subjected to detailed review; for values from 0.10 to 0.20, the question is reasonable but should be reconsidered; for values from 0.20 to 0.30, the question is moderately useful but may require minor revision [20, 24, 25].

### Characteristics of the study participants

The study included 81 women (98.8%) and 1 (1.2%) man. The age of the participants ranged from 25 to 66 years, with an average age of  $43.4 \pm 9.92$  years. Most participants (77.2%) had completed higher education, including 46.4% at the master's level and 32.8% at the bachelor's level. According to Polish law, the entire study group had qualifications in pressure ulcer prevention and the independent selection of pressure ulcer treatment methods. The selection of the study group was purposive because the participating nurses were involved in the prevention and treatment of pressure ulcers in independent practice as well as in primary health care (Polish POZ). Detailed data on the education of the study group are shown in Table 2.

### Results

The level of knowledge among the participants was assessed as above average, with the accuracy of responses in the test exceeding 60%. An evaluation of the test's consistency was conducted, with Cronbach's  $\alpha$  for the entire tool reaching 0.726. In the 3 respective subscales of the questionnaire, the obtained values of the  $\alpha$  coefficient were lower, reaching the following values: prevention 0.50, stage 0.47, and wound 0.38. The data are shown in Table 3.

Attention was drawn to the low  $\alpha$  coefficient (0.383) in the wound subscale. Therefore, 2 indicators were used to assess the quality of the PZ-PUKT questions: the DIFF and the DISCR. The difficulty index for each question was calculated as the percentage of participants who answered the question correctly, i.e. the ratio of those who answered the question correctly to

**Table 1.** Distribution of responses in the Pressure Ulcer Knowledge Test (PZ-PUKT)

| No. | Question content                                                                                                                                                                                                                                                                                                                      | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                                                                                                                                       |                |            | n    | %    | n     | %    | n          | %   |
| 1   | Slough is yellow or cream-colored necrotic/devitalised tissue on a wound bed<br><i>Włóknik to żółta lub kremowa zdewitalizowana tkanka w łóżysku rany</i>                                                                                                                                                                             | True           | Wound      | 62   | 75.6 | 17    | 20.7 | 3          | 3.7 |
| 2   | A pressure ulcer/injury is a sterile wound<br><i>Odleżyna to jałowa rana</i>                                                                                                                                                                                                                                                          | False          | Wound      | 8    | 9.8  | 72    | 87.8 | 2          | 2.4 |
| 3   | Foam dressings may increase wound pain<br><i>Opatrunki piankowe mogą zwiększać ból rany</i>                                                                                                                                                                                                                                           | False          | Wound      | 13   | 15.9 | 67    | 81.7 | 2          | 2.4 |
| 4   | Alkaline soap products should be used to cleanse soiled skin<br><i>Do oczyszczania skontaminowanej skóry należy stosować mydła alkaliczne</i>                                                                                                                                                                                         | False          | Prevention | 35   | 42.7 | 43    | 52.4 | 4          | 4.9 |
| 5   | Seating should be for short periods in an appropriate chair/wheelchair with a pressure redistribution cushion for persons at risk for pressure ulcers/injuries<br><i>Pozycję siedzącą należy stosować przez krótki czas na odpowiednim krześle/wózku inwalidzkim z poduszką redystrybuującą ucisk dla osób zagrożonych odleżynami</i> | True           | Prevention | 70   | 85.4 | 12    | 14.6 | 0          | 0.0 |
| 6   | A stage 3 pressure ulcer/injury is a partial thickness skin loss involving the epidermis and/or dermis<br><i>Odleżyna 3° (NPIAP) to uszkodzenie skóry obejmujące naskórek i/lub skórę właściwą</i>                                                                                                                                    | False          | Stage      | 54   | 65.9 | 27    | 32.9 | 1          | 1.2 |
| 7   | Hydrogel dressings should not be used on pressure ulcers/injuries with granulation tissue<br><i>Opatrunków hydrożelowych nie należy stosować na odleżyny z widoczną ziarniną</i>                                                                                                                                                      | False          | Wound      | 32   | 39.0 | 48    | 58.5 | 2          | 2.4 |
| 8   | Reposition individuals with or at risk of pressure ulcer/injury on an individualized schedule regardless of mobility level unless contraindicated<br><i>Należy zmieniać pozycję ciała osób z odleżynami (lub z ryzykiem) według indywidualnego harmonogramu, niezależnie od poziomu mobilności, jeśli nie ma przeciwwskazań</i>       | True           | Prevention | 69   | 84.1 | 12    | 14.6 | 1          | 1.2 |
| 9   | A pressure ulcer/injury scar will break down faster than unwounded skin<br><i>Blizna po wygojonej odleżynie ulega szybciej uszkodzeniu niż nieuszkodzona fizjologiczna skóra</i>                                                                                                                                                      | True           | Prevention | 61   | 74.4 | 17    | 20.7 | 4          | 4.9 |
| 10  | Pressure ulcers/injuries progress in a linear fashion from stage 1 to 2 to 3 to 4<br><i>Odleżyny postępują liniowo od 1° do 2°, następnie 3° i 4°</i>                                                                                                                                                                                 | False          | Stage      | 51   | 62.2 | 25    | 30.5 | 6          | 7.3 |
| 11  | Eschar is healthy tissue<br><i>Strup to zdrowa tkanka</i>                                                                                                                                                                                                                                                                             | False          | Wound      | 25   | 30.5 | 55    | 67.1 | 2          | 2.4 |

Table 1. Cont.

| No. | Question content                                                                                                                                                                                                                                         | Correct answer | Subscale   | True |      | False |      | Don't know |      |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|------|
|     |                                                                                                                                                                                                                                                          |                |            | n    | %    | n     | %    | n          | %    |
| 12  | Non-blanchable erythema anywhere in the body is a stage 1 pressure ulcer/injury<br><i>Nieblednący rumień w dowolnym miejscu ciała jest odleżyną 1°</i>                                                                                                   | False          | Stage      | 69   | 84.1 | 11    | 13.4 | 2          | 2.4  |
| 13  | The goal of palliative care is wound healing<br><i>Celem opieki paliatywnej jest gojenie ran</i>                                                                                                                                                         | False          | Prevention | 22   | 26.8 | 60    | 73.2 | 0          | 0.0  |
| 14  | A stage 2 pressure ulcer/injury is a full thickness skin loss<br><i>Odleżyna 2° to utrata pełnej grubości skóry</i>                                                                                                                                      | False          | Stage      | 38   | 46.3 | 43    | 52.4 | 1          | 1.2  |
| 15  | Dragging the patient up in bed increases friction<br><i>Przesuwanie pacjenta w łóżku zwiększa tarcie</i>                                                                                                                                                 | True           | Prevention | 76   | 92.7 | 6     | 7.3  | 0          | 0.0  |
| 16  | Increased body temperature is a risk factor for pressure ulcer/injury<br><i>Podwyższona temperatura ciała jest czynnikiem ryzyka odleżyn</i>                                                                                                             | True           | Prevention | 62   | 75.6 | 18    | 22.0 | 2          | 2.4  |
| 17  | Diabetes mellitus does not increase a person's risk for pressure ulcer/injury<br><i>Cukrzyca nie zwiększa ryzyka odleżyn</i>                                                                                                                             | False          | Prevention | 6    | 7.3  | 74    | 90.2 | 2          | 2.4  |
| 18  | A comprehensive pain assessment should be done on persons with pressure ulcer/injury<br><i>U osób z odleżynami należy przeprowadzić kompleksową ocenę bólu</i>                                                                                           | True           | Wound      | 68   | 82.9 | 12    | 14.6 | 2          | 2.4  |
| 19  | High absorbency incontinence products should be used for individuals with pressure ulcers/injuries when incontinence is present<br><i>Wyroby medyczne o wysokiej chłonności powinny być stosowane u osób z odleżynami w przypadku nietrzymania moczu</i> | True           | Prevention | 66   | 80.5 | 12    | 14.6 | 4          | 4.9  |
| 20  | A pressure redistribution surface manages tissue load and the microclimate against the skin<br><i>Powierzchnia redystrybucji nacisku reguluje obciążenie tkanek i mikroklimat skóry</i>                                                                  | True           | Prevention | 65   | 79.3 | 8     | 9.8  | 9          | 11.0 |
| 21  | A stage 2 pressure ulcer/injury may have slough in its base<br><i>Odleżyna 2° może mieć wilgotną tkankę martwiczą w dnie rany</i>                                                                                                                        | False          | Stage      | 37   | 45.1 | 41    | 50.0 | 4          | 4.9  |
| 22  | If necrotic tissue is present and if bone can be seen or palpated, the ulcer is a stage 4<br><i>Jeśli w ranie jest widoczna lub wyczuwalna kość z obecną tkanką martwiczą, to odleżyna jest 4°</i>                                                       | True           | Stage      | 68   | 82.9 | 12    | 14.6 | 2          | 2.4  |
| 23  | Oral nutritional supplements should be used in addition to usual diet for individuals at high risk for pressure ulcers/injuries<br><i>Doustne suplementy diety powinny być stosowane jako dodatek do zwykłej diety u osób z wysokim ryzykiem odleżyn</i> | True           | Prevention | 74   | 90.2 | 7     | 8.5  | 1          | 1.2  |

Table 1. Cont.

| No. | Question content                                                                                                                                                                                                                                                                              | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                                                                                               |                |            | n    | %    | n     | %    | n          | %   |
| 24  | To prevent heel pressure ulcer/injury, the weight of the leg should be distributed along the calf during heel elevation<br><i>Aby zapobiec odleżynom pięt, podczas podnoszenia pięty ciężar nogi powinien być rozłożony wzdłuż łydki</i>                                                      | True           | Prevention | 69   | 84.1 | 9     | 11.0 | 4          | 4.9 |
| 25  | When necrotic tissue is removed, an unstageable pressure ulcer/injury will be classified as a stage 2 ulcer/injury<br><i>Gdy tkanka martwicza zostanie usunięta z łóżyska rany, odleżyna niesklasyfikowana (UPI) zostanie sklasyfikowana jako odleżyna 2°</i>                                 | False          | Stage      | 26   | 31.7 | 53    | 64.6 | 3          | 3.7 |
| 26  | Donut devices/ring cushions help to prevent pressure ulcers/injuries<br><i>Podstawowe urządzenia i asortyment odciążający (wałki, podkładki) zmniejszają ryzyko odleżyn</i>                                                                                                                   | False          | Prevention | 79   | 96.3 | 2     | 2.4  | 1          | 1.2 |
| 27  | It is the nurse's responsibility to be sure a specialty bed is working properly and document its use<br><i>Obowiązkiem pielęgniarki jest upewnienie się, że łóżko specjalistyczne działa prawidłowo, zgodnie z instrukcją użycia</i>                                                          | True           | Prevention | 63   | 76.8 | 18    | 22.0 | 1          | 1.2 |
| 28  | ABD pads may be used to protect the skin<br><i>Wkładki absorpcyjne mogą być używane do ochrony skóry</i>                                                                                                                                                                                      | False          | Wound      | 55   | 67.1 | 24    | 29.3 | 3          | 3.7 |
| 29  | Persons at risk for pressure ulcers/injuries should be nutritionally assessed (i.e., weight, nutrition intake, blood work, etc.)<br><i>Osoby zagrożone odleżynami powinny być poddane ocenie żywieniowej (tj. masa ciała, przyjmowane składniki odżywcze, badania biochemiczne krwi itp.)</i> | True           | Prevention | 76   | 92.7 | 4     | 4.9  | 2          | 2.4 |
| 30  | Biofilms may develop in any type of wound<br><i>Biofilm może powstać w każdej ranie</i>                                                                                                                                                                                                       | True           | Wound      | 62   | 75.6 | 18    | 22.0 | 2          | 2.4 |
| 31  | Critical care patients may need slow, gradual turning because of being hemodynamically unstable<br><i>Z powodu niestabilności hemodynamicznej pacjenci intensywnej opieki mogą potrzebować powolnej, stopniowej zmiany pozycji</i>                                                            | True           | Prevention | 71   | 86.6 | 8     | 9.8  | 3          | 3.7 |
| 32  | Blanching refers to whiteness when pressure is applied to a reddened area<br><i>Blednące zaczerwienienie odnosi się do ucisku zaczerwienionego/podminowanego obszaru skóry</i>                                                                                                                | True           | Stage      | 65   | 79.3 | 15    | 18.3 | 2          | 2.4 |
| 33  | A blister on the heel is nothing to worry about<br><i>Pęcherz na pięcie nie stanowi problemu w toku opieki</i>                                                                                                                                                                                | False          | Stage      | 15   | 18.3 | 67    | 81.7 | 0          | 0.0 |



Table 1. Cont.

| No. | Question content                                                                                                                                                                                                                                            | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                                                             |                |            | n    | %    | n     | %    | n          | %   |
| 34  | Staff education alone may reduce the incidence of pressure ulcers/injuries<br><i>Sama edukacja personelu może zmniejszyć częstość występowania odleżyn</i>                                                                                                  | False          | Prevention | 64   | 78.0 | 17    | 20.7 | 1          | 1.2 |
| 35  | Early changes associated with pressure ulcer/injury development may be missed in persons with darker skin tones<br><i>Wczesne zmiany związane z rozwojem odleżyn mogą zostać przeoczone u osób z ciemniejszym zabarwieniem skóry</i>                        | True           | Stage      | 59   | 72.0 | 21    | 25.6 | 2          | 2.4 |
| 36  | A footrest should not be used for an immobile patient whose feet do not reach the floor<br><i>Podnóżek nie powinien być stosowany u pacjentów unieruchomionych, których stopy nie sięgają do podłogi</i>                                                    | False          | Prevention | 36   | 43.9 | 44    | 53.7 | 2          | 2.4 |
| 37  | Bone, tendon, or muscle may be exposed in a stage 3 pressure ulcer/injury<br><i>Kość, ścięgno lub mięsień mogą być odsłonięte w przypadku odleżyny 3°</i>                                                                                                   | False          | Stage      | 37   | 45.1 | 43    | 52.4 | 2          | 2.4 |
| 38  | A topical opioid may help manage acute pressure ulcer/injury pain<br><i>Miejscowy opioid może pomóc w leczeniu ostrego bólu związanego z odleżynami</i>                                                                                                     | True           | Wound      | 46   | 56.1 | 32    | 39.0 | 4          | 4.9 |
| 39  | Wound biofilm is associated with decreased wound drainage<br><i>Biofilm powoduje zmniejszenie wysięku z rany</i>                                                                                                                                            | False          | Wound      | 36   | 43.9 | 41    | 50.0 | 5          | 6.1 |
| 40  | It may be difficult to distinguish between moisture associated skin damage and a pressure ulcer/injury<br><i>Odróżnienie uszkodzenia skóry związanego z wilgocią (IAD) od odleżyn może być trudne</i>                                                       | True           | Stage      | 53   | 64.6 | 28    | 34.1 | 1          | 1.2 |
| 41  | Wounds that become chronic are frequently stalled in the proliferative phase of healing<br><i>Rany przewlekłe są często opóźnione w proliferacyjnej fazie gojenia</i>                                                                                       | False          | Wound      | 55   | 67.1 | 25    | 30.5 | 2          | 2.4 |
| 42  | Dry, adherent eschar on the heels should be removed for the wound to heal<br><i>Suchy, przylegający strup na piętach należy usunąć, aby rana się zagoiła</i>                                                                                                | False          | Wound      | 38   | 46.3 | 44    | 53.7 | 0          | 0.0 |
| 43  | Deep tissue injury is a localized area of purple or maroon discolored intact skin or a blood-filled blister<br><i>Uszkodzenie tkanek głębokich występuje w postaci nienaruszonej skóry w kolorze fioletowym, bordowym lub jako pęcherz wypełniony krwią</i> | True           | Stage      | 58   | 70.7 | 24    | 29.3 | 0          | 0.0 |
| 44  | Massage of bony prominences is essential for quality skin care<br><i>Masaż wypukłości kostnych jest niezbędny dla wysokiej jakości pielęgnacji skóry</i>                                                                                                    | False          | Prevention | 47   | 57.3 | 33    | 40.2 | 2          | 2.4 |

Table 1. Cont.

| No. | Question content                                                                                                                                                                                                                                                                                                                                                          | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                                                                                                                                                                           |                |            | n    | %    | n     | %    | n          | %   |
| 45  | Poor posture in a wheelchair may be the cause of a pressure ulcer/injury<br><i>Niefizjologiczna pozycja na wózku inwalidzkim może być przyczyną odleżyny/urazu</i>                                                                                                                                                                                                        | True           | Prevention | 72   | 87.8 | 9     | 11.0 | 1          | 1.2 |
| 46  | For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals<br><i>W przypadku osób z nietrzymaniem moczu higiena skóry powinna odbywać się w momencie inkontynencji oraz w rutynowych odstępach czasu</i>                                                                                                               | True           | Prevention | 68   | 82.9 | 11    | 13.4 | 3          | 3.7 |
| 47  | Patients who are spinal cord injured need knowledge about pressure ulcers/injuries prevention and self-care<br><i>Pacjenci z uszkodzeniem rdzenia kręgowego potrzebują wiedzy na temat zapobiegania odleżynom i samoopieki</i>                                                                                                                                            | True           | Prevention | 73   | 89.0 | 6     | 7.3  | 3          | 3.7 |
| 48  | In large and deep pressure ulcers/injuries, the number of dressings used needs to be counted and documented so that all dressings are removed at the next dressing change<br><i>W przypadku dużych i głębokich odleżyn należy policzyć i udokumentować liczbę zastosowanych opatrunków, tak aby wszystkie opatrunki zostały usunięte przy następnej zmianie opatrunku</i> | True           | Wound      | 56   | 68.3 | 24    | 29.3 | 2          | 2.4 |
| 49  | A mucosal membrane pressure ulcer/injury as the result of medical equipment is a stage 3<br><i>Odleżyna błony śluzowej w wyniku utrzymania sprzętu medycznego jest określana jako 3°</i>                                                                                                                                                                                  | False          | Stage      | 37   | 45.1 | 39    | 47.6 | 6          | 7.3 |
| 50  | Pressure ulcers/injuries can occur around the ears in a person using oxygen by nasal cannula<br><i>U osoby stosującej tlen przez kaniulę nosową mogą wystąpić odleżyny wokół uszu</i>                                                                                                                                                                                     | True           | Stage      | 74   | 90.2 | 7     | 8.5  | 1          | 1.2 |
| 51  | Persons, who are immobile and can be taught, should shift their weight every 30 minutes while sitting in a chair<br><i>Osoby z ograniczeniem samoopieki z powodu paraplegii powinny co 30 minut przenosić ciężar ciała, przebywając w pozycji siedzącej</i>                                                                                                               | False          | Prevention | 52   | 63.4 | 26    | 31.7 | 4          | 4.9 |
| 52  | Stage 1 pressure ulcers/injuries are intact skin with non-blanchable erythema over a bony prominence<br><i>Odleżyny 1° to nieuszkodzona skóra z nieblednącym rumieniem na wypukłości kostnej</i>                                                                                                                                                                          | True           | Stage      | 65   | 79.3 | 15    | 18.3 | 2          | 2.4 |
| 53  | When the ulcer/injury base is totally covered by slough, it cannot be staged<br><i>Kiedy odleżyna jest całkowicie pokryta tkanką martwiczą (UPI), nie można dokładnie ocenić głębokości uszkodzenia tkanki</i>                                                                                                                                                            | True           | Stage      | 69   | 84.1 | 10    | 12.2 | 3          | 3.7 |



Table 1. Cont.

| No. | Question content                                                                                                                                                                                                   | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                    |                |            | n    | %    | n     | %    | n          | %   |
| 54  | Selection of a pressure redistribution surface only considers the person's level of pressure ulcer/injury risk<br><i>Wybór sprzętu odciążającego uwzględnia jedynie poziom ryzyka odleżyn u danej osoby</i>        | False          | Prevention | 38   | 46.3 | 42    | 51.2 | 2          | 2.4 |
| 55  | Shear injury is not a concern for a patient using a pressure redistribution surface<br><i>Uraz ścinania nie jest problemem dla pacjenta korzystającego z powierzchni redystrybucji nacisku</i>                     | False          | Prevention | 31   | 37.8 | 46    | 56.1 | 5          | 6.1 |
| 56  | It is not necessary to have the patient with a spinal cord injury evaluated for seating<br><i>Nie ma konieczności oceniania pacjenta z urazem rdzenia kręgowego pod kątem przebywania w pozycji siedzącej</i>      | False          | Prevention | 21   | 25.6 | 60    | 73.2 | 1          | 1.2 |
| 57  | To help prevent pressure ulcers/injuries, the head of the bed should be elevated at more than a 45-degree angle<br><i>Aby zapobiec odleżynom, wezglowie łóżka powinno być uniesione pod kątem większym niż 45°</i> | False          | Prevention | 19   | 23.2 | 61    | 74.4 | 2          | 2.4 |
| 58  | Urinary catheter tubing should be positioned under the leg<br><i>Przewód cewnika moczowego należy umieścić pod nogą chorego</i>                                                                                    | False          | Prevention | 13   | 15.9 | 68    | 82.9 | 1          | 1.2 |
| 59  | Properly sized equipment may help avoid pressure ulcers/injuries in bariatric patients<br><i>Odpowiednio dobrany sprzęt może pomóc w uniknięciu odleżyn u pacjentów bariatrycznych</i>                             | True           | Prevention | 77   | 93.9 | 5     | 6.1  | 0          | 0.0 |
| 60  | A dressing should keep the wound bed moist, but the surrounding skin dry<br><i>Opatrunek powinien utrzymywać wilgotne łóżysko rany, nie prowadząc do maceracji skóry</i>                                           | True           | Wound      | 80   | 97.6 | 2     | 2.4  | 0          | 0.0 |
| 61  | Hydrocolloid and film dressings should be removed quickly to decrease pain<br><i>Opatrunki hydrokoloidowe i foliowe należy szybko zdejmować, aby zmniejszyć ból rany</i>                                           | False          | Wound      | 21   | 25.6 | 60    | 73.2 | 1          | 1.2 |
| 62  | Nurses should avoid turning a patient onto a reddened area<br><i>Pielęgniarki powinny unikać układania pacjenta na obszarze zaczerwienionym</i>                                                                    | True           | Prevention | 72   | 87.8 | 9     | 11.0 | 1          | 1.2 |
| 63  | Skin tears are classified as stage 2 pressure ulcers/injuries<br><i>Rozdarcia skóry (skin tears) są klasyfikowane jako odleżyny 2°</i>                                                                             | False          | Stage      | 55   | 67.1 | 25    | 30.5 | 2          | 2.4 |
| 64  | A stage 3 pressure ulcers/injuries may appear shallow if located on the ear, malleolus/ankle, or heel<br><i>Odleżyny 3° mogą wydawać się płytkie, jeśli znajdują się na uszach, kostkach lub piętach</i>           | True           | Stage      | 67   | 81.7 | 14    | 17.1 | 1          | 1.2 |

Table 1. Cont.

| No. | Question content                                                                                                                                                                                                  | Correct answer | Subscale   | True |      | False |      | Don't know |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|------|------|-------|------|------------|-----|
|     |                                                                                                                                                                                                                   |                |            | n    | %    | n     | %    | n          | %   |
| 65  | Hydrocolloid dressings should be used on stage 2 infected ulcer/injury<br><i>Opatrunki hydrokoloidowe należy stosować w przypadku odleżyn zakażonych 2°</i>                                                       | False          | Wound      | 50   | 61.0 | 28    | 34.1 | 4          | 4.9 |
| 66  | Pressure ulcers/injuries are a lifelong concern for a person who is spinal cord injured<br><i>Odleżyny są problemem na całe życie osoby, która doznała urazu rdzenia kręgowego</i>                                | True           | Prevention | 57   | 69.5 | 25    | 30.5 | 0          | 0.0 |
| 67  | Pressure ulcers/injuries should not be cleansed with drinking water<br><i>Odleżyn nie należy dekontaminować wodą pitną</i>                                                                                        | False          | Wound      | 54   | 65.9 | 27    | 32.9 | 1          | 1.2 |
| 68  | Alginate dressings can be used for stage 3 and 4 pressure ulcers/injuries with moderate exudate<br><i>Opatrunki alginianowe można stosować w przypadku odleżyn 3° i 4° z umiarkowanym wysiękiem</i>               | True           | Wound      | 64   | 78.0 | 17    | 20.7 | 1          | 1.2 |
| 69  | Deep tissue injury will not progress to another ulcer/injury stage<br><i>Uszkodzenie tkanek głębokich nie spowoduje poważniejszych destrukcji</i>                                                                 | False          | Stage      | 11   | 13.4 | 69    | 84.1 | 2          | 2.4 |
| 70  | Film dressings absorb a lot of drainage<br><i>Opatrunki foliowe pochłaniają dużo wysięku</i>                                                                                                                      | False          | Wound      | 7    | 8.5  | 70    | 85.4 | 5          | 6.1 |
| 71  | Non-sting skin prep should be used around a wound to protect surrounding tissue from moisture<br><i>Wokół rany należy zastosować preparat zabezpieczający skórę, aby chronić otaczającą tkankę przed wilgocią</i> | True           | Wound      | 72   | 87.8 | 7     | 8.5  | 3          | 3.7 |
| 72  | Stage 4 pressure ulcers/injuries always have undermining<br><i>Odleżyny 4° zawsze mają cechy podminowania</i>                                                                                                     | False          | Stage      | 51   | 62.2 | 30    | 36.6 | 1          | 1.2 |

the number of all respondents. Three questions were identified that should be redesigned due to their low index (questions 12, 26, and 34). The average difficulty index for all participants was 0.67, and 26 questions (36.1%) had a good level of difficulty. However, excluding participants who chose the “don’t know” option, the average difficulty index only slightly increased to 0.68, with 27 questions (37.5%) achieving a good level of difficulty.

The average discrimination index was 0.21, with 19 questions (26.4%) achieving a good level. After excluding participants who chose the “don’t know” option, the average discrimination index decreased to 0.18, with 14 questions (19.4%) achieving a good level.

In the entire set, there were 9 questions (12.5%) that simultaneously had a good level of difficulty and discrimination ( $DIFF = 0.30\text{--}0.70$  and  $DISC \geq 0.30$ ). After excluding participants who chose the “don’t know” option, the number of questions decreased to 7 (9.7%). The data are shown in Table 4.

## Discussion

In the conducted study, the psychometric properties of the Pressure Ulcer Knowledge Test (PZ-PUKT) were examined. It was confirmed that the level of knowledge among the participants was above average. The accuracy of the correct answers in the test exceeded 60%, although it was observed that the option “don’t know” was much less frequently chosen

**Table 2.** Professional education level and postgraduate training of the participants ( $N = 82$ )

| Factor                                        | <i>n</i> | %     |
|-----------------------------------------------|----------|-------|
| Professional education level:                 |          |       |
| Secondary                                     | 13       | 15.9  |
| Bachelor's                                    | 33       | 40.2  |
| Master's                                      | 36       | 43.9  |
| Total                                         | 82       | 100.0 |
| Postgraduate training:                        |          |       |
| Postgraduate training (specialisation)        | 17       | 20.7  |
| Specialized courses qualifying for wound care | 15       | 18.3  |
| Other                                         | 50       | 61.0  |
| Total                                         | 82       | 100   |

compared to other studies [20, 26]. The assessment of the overall test consistency (Cronbach's  $\alpha = 0.726$ ) was at an acceptable level; however, a low consistency was observed in the 3 individual subscales. Two hypotheses regarding the low consistency of the individual scales were assumed, related to incorrect question construction or inadequate knowledge in the specific area among the participants. To verify the hypotheses, qualitative indicators recommended in the validation study conducted by Moharramzadeh *et al.* [20] were used. The DIFF and DISCR are indicators illustrating the extent to which a given question differentiates between individuals achieving high and low scores on the scale. The conducted analysis unequivocally indicates that the question construction is correct and falls within the preferred ranges. Three questions were noted that need to be reconstructed, while the remaining questions forming the tool are at an acceptable level. A detailed analysis of the tool draws attention to the low-quality responses, especially in the domain of assessing wounds, which may indicate a lower level of knowledge among the participants regarding wound assessment. In the overall assessment of the tool, the obtained results are satisfactory and comparable to other studies evaluating the tool in Iran [20], the Philippines [22], China [26], and Brazil [27].

Observational studies over the past 2 decades have highlighted an increase in the incidence of pressure ulcers, with healthcare workers reporting difficulties in providing effective preventive and therapeutic measures, especially among older adults, chronically ill individuals, and those in terminal condition [2, 3, 17]. In the realm of healthcare provision, emphasis is placed on the adoption of "evidence-based practice" [28]. Both in Poland and globally, guidelines stress the importance of healthcare personnel's knowledge level in pressure ulcer prevention and treatment. Utilising a globally accepted standardised tool would provide an opportunity for an objective assessment of healthcare personnel's preparedness for pressure ulcer prevention and treatment, as well as to identify areas for reinforcement and development.

The process of cultural adaptation, validation, and examination of the psychometric properties of the Polish language version of the PZ-PUKT test offers an opportunity to fill an existing knowledge gap in this thematic area. This study serves as the basis for further in-depth multicentre research within the country and establishes a bridge with researchers from other countries for the exchange of experience [29].

### Implications for practice

Nurses possess the competencies to implement comprehensive preventive and therapeutic interventions in the identification and treatment of pressure ulcers. Having knowledge resources in this area alongside practical skills is highly demanded. This study provided valuable insights into the strengths and weaknesses of the PZ-PUKT, as well as the level of knowledge in specific domains among the surveyed sample of nurses.

### Limitations

This study utilised a specific and purposive sample of nurses engaged in independent practice as well as in primary health care (Polish POZ), and the obtained results of the knowledge level should not be generalised to other areas of nursing. The extensive range of questions comprising the PZ-PUKT may have influenced the accuracy in responding to the questions, and it can be assumed that during the time that

**Table 3.** Summary of distributions of the Pressure Ulcer Knowledge Test (PZ-PUKT) scales in the study group ( $N = 82$ )

| Variable      | Number of indicators | Mean | Median | Min. | Max. | Standard dev. | % correct answers | <i>n</i> | Cronbach's $\alpha$ |
|---------------|----------------------|------|--------|------|------|---------------|-------------------|----------|---------------------|
| PZ-PUKT scale | 72                   | 48.0 | 49     | 25   | 61   | 6.7           | 66.7              | 82       | 0.726               |
| Prevention    | 31                   | 22.2 | 23     | 10   | 28   | 3.1           | 71.5              | 82       | 0.509               |
| Stage         | 21                   | 12.8 | 13     | 6    | 19   | 2.7           | 61.0              | 82       | 0.475               |
| Wound         | 20                   | 13.1 | 13     | 5    | 19   | 2.4           | 65.3              | 82       | 0.383               |

**Table 4.** Assessment of the quality of questions in the questionnaire based on the difficulty and discrimination indices

| With the option of "I don't know" (n = 72) |      |       | Without the option of "I don't know" |       |            |
|--------------------------------------------|------|-------|--------------------------------------|-------|------------|
| Item                                       | DIFF | DISC  | DIFF                                 | DISC  | n (%)      |
| 1                                          | 0.76 | 0.14  | 0.79                                 | 0.06  | 79 (96.3)  |
| 2                                          | 0.88 | 0.32  | 0.90                                 | 0.29  | 80 (97.6)  |
| 3                                          | 0.82 | 0.36  | 0.84                                 | 0.36  | 80 (97.6)  |
| 4                                          | 0.52 | 0.09  | 0.55                                 | 0.10  | 78 (95.1)  |
| 5                                          | 0.85 | 0.05  | 0.85                                 | 0.05  | 82 (100.0) |
| 6                                          | 0.33 | 0.23  | 0.33                                 | 0.22  | 81 (98.8)  |
| 7                                          | 0.59 | 0.14  | 0.60                                 | 0.14  | 80 (97.6)  |
| 8                                          | 0.84 | 0.18  | 0.85                                 | 0.15  | 81 (98.8)  |
| 9                                          | 0.74 | 0.09  | 0.78                                 | -0.02 | 78 (95.1)  |
| 10                                         | 0.31 | 0.00  | 0.33                                 | 0.00  | 76 (92.7)  |
| 11                                         | 0.67 | 0.41  | 0.69                                 | 0.39  | 80 (97.6)  |
| 12                                         | 0.13 | 0.05  | 0.14                                 | 0.03  | 80 (97.6)  |
| 13                                         | 0.73 | 0.14  | 0.73                                 | 0.14  | 82 (100.0) |
| 14                                         | 0.52 | 0.45  | 0.53                                 | 0.44  | 81 (98.8)  |
| 15                                         | 0.93 | 0.14  | 0.93                                 | 0.14  | 82 (100.0) |
| 16                                         | 0.76 | 0.41  | 0.78                                 | 0.39  | 80 (97.6)  |
| 17                                         | 0.90 | 0.14  | 0.93                                 | 0.10  | 80 (97.6)  |
| 18                                         | 0.83 | 0.27  | 0.85                                 | 0.21  | 80 (97.6)  |
| 19                                         | 0.81 | 0.18  | 0.85                                 | 0.08  | 78 (95.1)  |
| 20                                         | 0.79 | 0.46  | 0.89                                 | 0.27  | 73 (89.0)  |
| 21                                         | 0.50 | 0.36  | 0.53                                 | 0.35  | 78 (95.1)  |
| 22                                         | 0.83 | 0.18  | 0.85                                 | 0.15  | 80 (97.6)  |
| 23                                         | 0.90 | 0.18  | 0.91                                 | 0.15  | 81 (98.8)  |
| 24                                         | 0.84 | 0.23  | 0.89                                 | 0.16  | 78 (95.1)  |
| 25                                         | 0.65 | 0.45  | 0.67                                 | 0.41  | 79 (96.3)  |
| 26                                         | 0.02 | -0.09 | 0.03                                 | -0.10 | 81 (98.8)  |
| 27                                         | 0.77 | 0.00  | 0.78                                 | -0.04 | 81 (98.8)  |
| 28                                         | 0.29 | 0.18  | 0.30                                 | 0.14  | 79 (96.3)  |
| 29                                         | 0.93 | 0.23  | 0.95                                 | 0.15  | 80 (97.6)  |
| 30                                         | 0.76 | 0.23  | 0.78                                 | 0.16  | 80 (97.6)  |
| 31                                         | 0.87 | 0.27  | 0.90                                 | 0.17  | 79 (96.3)  |
| 32                                         | 0.79 | 0.00  | 0.81                                 | -0.04 | 80 (97.6)  |
| 33                                         | 0.82 | 0.55  | 0.82                                 | 0.55  | 82 (100.0) |
| 34                                         | 0.21 | 0.05  | 0.21                                 | 0.04  | 81 (98.8)  |
| 35                                         | 0.72 | 0.18  | 0.74                                 | 0.15  | 80 (97.6)  |
| 36                                         | 0.54 | 0.18  | 0.55                                 | 0.14  | 80 (97.6)  |
| 37                                         | 0.52 | 0.32  | 0.54                                 | 0.29  | 80 (97.6)  |

Table 4. Cont.

| With the option of “I don’t know” ( <i>n</i> = 72) |      |       | Without the option of “I don’t know” |       |              |
|----------------------------------------------------|------|-------|--------------------------------------|-------|--------------|
| Item                                               | DIFF | DISC  | DIFF                                 | DISC  | <i>n</i> (%) |
| 38                                                 | 0.56 | 0.00  | 0.59                                 | 0.03  | 78 (95.1)    |
| 39                                                 | 0.50 | 0.36  | 0.53                                 | 0.36  | 77 (93.9)    |
| 40                                                 | 0.65 | 0.18  | 0.65                                 | 0.16  | 81 (98.8)    |
| 41                                                 | 0.31 | 0.05  | 0.31                                 | 0.03  | 80 (97.6)    |
| 42                                                 | 0.54 | 0.14  | 0.54                                 | 0.14  | 82 (100.0)   |
| 43                                                 | 0.71 | 0.09  | 0.71                                 | 0.09  | 82 (100.0)   |
| 44                                                 | 0.40 | −0.05 | 0.41                                 | −0.07 | 80 (97.6)    |
| 45                                                 | 0.88 | 0.36  | 0.89                                 | 0.33  | 81 (98.8)    |
| 46                                                 | 0.83 | 0.27  | 0.86                                 | 0.24  | 79 (96.3)    |
| 47                                                 | 0.89 | 0.18  | 0.92                                 | 0.14  | 79 (96.3)    |
| 48                                                 | 0.68 | 0.27  | 0.70                                 | 0.22  | 80 (97.6)    |
| 49                                                 | 0.48 | 0.18  | 0.51                                 | 0.12  | 76 (92.7)    |
| 50                                                 | 0.90 | 0.27  | 0.91                                 | 0.24  | 81 (98.8)    |
| 51                                                 | 0.32 | −0.18 | 0.33                                 | −0.23 | 78 (95.1)    |
| 52                                                 | 0.79 | 0.14  | 0.81                                 | 0.07  | 80 (97.6)    |
| 53                                                 | 0.84 | 0.23  | 0.87                                 | 0.12  | 79 (96.3)    |
| 54                                                 | 0.51 | 0.32  | 0.53                                 | 0.29  | 80 (97.6)    |
| 55                                                 | 0.56 | 0.41  | 0.60                                 | 0.43  | 77 (93.9)    |
| 56                                                 | 0.73 | 0.23  | 0.74                                 | 0.20  | 81 (98.8)    |
| 57                                                 | 0.74 | 0.45  | 0.76                                 | 0.41  | 80 (97.6)    |
| 58                                                 | 0.83 | 0.14  | 0.84                                 | 0.10  | 81 (98.8)    |
| 59                                                 | 0.94 | 0.14  | 0.94                                 | 0.14  | 82 (100.0)   |
| 60                                                 | 0.98 | 0.09  | 0.98                                 | 0.09  | 82 (100.0)   |
| 61                                                 | 0.73 | 0.55  | 0.74                                 | 0.59  | 81 (98.8)    |
| 62                                                 | 0.88 | 0.09  | 0.89                                 | 0.05  | 81 (98.8)    |
| 63                                                 | 0.31 | 0.18  | 0.31                                 | 0.17  | 80 (97.6)    |
| 64                                                 | 0.82 | 0.18  | 0.83                                 | 0.15  | 81 (98.8)    |
| 65                                                 | 0.34 | 0.18  | 0.36                                 | 0.18  | 78 (95.1)    |
| 66                                                 | 0.70 | 0.05  | 0.70                                 | 0.05  | 82 (100.0)   |
| 67                                                 | 0.33 | 0.14  | 0.33                                 | 0.14  | 81 (98.8)    |
| 68                                                 | 0.78 | 0.23  | 0.79                                 | 0.23  | 81 (98.8)    |
| 69                                                 | 0.84 | 0.55  | 0.86                                 | 0.50  | 80 (97.6)    |
| 70                                                 | 0.85 | 0.36  | 0.91                                 | 0.26  | 77 (93.9)    |
| 71                                                 | 0.88 | 0.18  | 0.91                                 | 0.10  | 79 (96.3)    |
| 72                                                 | 0.37 | 0.55  | 0.37                                 | 0.54  | 81 (98.8)    |

the participants had to prepare for the questionnaire, the quality of responses may have deteriorated.

## Conclusions

The PZ-PUKT questionnaire meets the basic standards regarding the consistency and quality of question construction, despite 3 questions requiring further refinement of the tool. Further research utilising this questionnaire is recommended, especially within the framework of higher education and specialised training courses. The obtained results should be evaluated and collected from academic centres to systematise and evaluate the knowledge domain for future recommendations in the prevention and treatment of pressure ulcers.

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## Conflict of interest

The authors declare no conflict of interest.

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