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Knowledge and attitudes regarding pressure injuries among assistant nurses in a clinical context

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Abstract

This study aimed to evaluate assistant nurses' knowledge of and attitudes towards pressure injuries in a clinical setting. It employed a cross-sectional design, using two validated surveys: PUKAT 2.0 and APUP, alongside open-ended questions. A convenience sample of 88 assistant nurses from five wards across two departments at a 600-bed university hospital in Sweden participated. Participants answered the questionnaire and open-ended questions, followed by a learning seminar led by the study leader covering PUKAT 2.0 knowledge questions. The seminar ended with an evaluation of this training approach. Results revealed a significant knowledge gap in pressure injury prevention among assistant nurses, with a mean PUKAT 2.0 knowledge score of 33.8 and a standard deviation of ±11.7 (a score of 60 is deemed satisfactory). Only 3.4% ($n = 3$) of participants achieved a satisfactory knowledge score. However, attitudes towards pressure injury prevention, assessed by the APUP tool, were generally positive among the majority of the participants. Open-ended questions and evaluations of the seminar showed assistant nurses' desire for pressure injury prevention training and their appreciation for the seminar format. Further studies need to evaluate recurrent training procedures and departmental strategies aimed at reducing the knowledge gap among healthcare staff.

KEYWORDS

assistant nurses, attitudes, evidence-based practice, knowledge, pressure injury

Key Messages

- Validated surveys, specifically PUKAT 2.0 and APUP, were used to assess the knowledge and attitudes of assistant nurses regarding pressure injury prevention at a Swedish university hospital.
- Assistant nurses' knowledge of pressure injury prevention did not reach satisfactory levels, revealing a significant knowledge gap that must be addressed by offering suitable training and adjustments to the current educational practices.
- The attitude of assistant nurses towards pressure injury prevention was found to be positive.
- The need for more pressure injury prevention training among assistant nurses was not only identified by the PUKAT 2.0 tool but a majority of participants also asked for more education in the format provided during this study.

1 | INTRODUCTION

Pressure injuries are considered as an adverse event in healthcare and are a significant healthcare issue globally, often resulting in severe pain, reduced quality of life and substantial costs[1–4] The primary cause of pressure injuries is pressure and/or shearing of the skin. They often occur over bony prominences, although they can occur anywhere on the patient's body, in particular under medical devices. Despite being largely preventable, their prevalence remains high.[1] Studies in healthcare settings indicate a prevalence from 0% to 72.5%, with a large variation between clinical and geographic settings.[1,5] Prevention of pressure injuries is essential and reflects the standard of care.[6] Thus, the prevalence of pressure injuries can be seen as a quality indicator of nursing care in hospitals.[7] Nursing staff play a crucial role in pressure injury prevention, making their knowledge and attitudes critical for effective management.[6,8–10] This study aims to evaluate the knowledge and attitudes of assistant nurses towards pressure injuries in a clinical setting. Understanding these factors can help identify educational needs and improve prevention strategies.

2 | BACKGROUND

There are international and national guidelines for pressure injury prevention in place. According to these guidelines, regular surveys should be carried out among healthcare professionals to evaluate the educational needs of clinical staff. The knowledge and attitudes of nursing staff towards pressure injury play an essential role in treatment planning, prescribing appropriate prevention measures for each patient, and subsequently evaluating and achieving these preventive measures.[1] Particular attention needs to be paid to the nursing staff who are working in positions that require lower levels of education, as well as those who have limited experience in caring for patients with pressure injuries.[11,12] Nurses who receive frequent training and regularly care for patients with pressure injuries tend to have better knowledge of pressure injuries compared to those who provide sporadic care or have never participated in pressure injury training.[13–16] In addition, nurses with higher levels of education were found to have better knowledge and skills compared to those with lower levels of education.[13,14] It has also been shown that negative attitudes towards pressure injury prevention may result in a suboptimal quality of prevention efforts.[17] In Sweden, registered nurses have a 3-year Bachelor of Science degree in nursing and are registered with the National Board of Health and Welfare,[18] while assistant nurses have completed 3 years in upper secondary school education with an emphasis on basic nursing care. Although registered nurses in Sweden have the primary responsibility for risk assessment of pressure injuries, it has been shown that assistant nurses often have closer patient contact than registered nurses regarding skin inspection.[19,20] Registered nurses usually trust the knowledge of assistant nurses and often delegate pressure injury prevention tasks to them.[6] Based on the assistant nurses' close involvement in pressure injury risk assessment, it is of great importance to evaluate their knowledge and attitudes towards pressure injuries. The Pressure Ulcer Knowledge Assessment Tool (PUKAT) 2.0 and Attitude towards Pressure Ulcer Prevention (APUP) tool are both validated instruments, which measure knowledge and attitudes regarding pressure injuries.[10,17] These tools are commonly used internationally for assessing knowledge and attitudes towards pressure injuries and have been used in

many recent studies worldwide.[8–15] However, few studies have reported on the situation in Sweden. Previous studies in Sweden have assessed the knowledge and attitudes of nursing students, registered nurses in hospitals,[16] and assistant nurses in elderly care.[21] This study focuses on assistant nurses at a hospital, in particular due to their active involvement in pressure injury risk assessment in Sweden. It is crucial to identify the strengths and weaknesses in assistant nurses' knowledge and attitudes about pressure injuries in order to identify potential knowledge gaps and determine what kind of pressure injury training would be the most beneficial for assistant nurses, thus ultimately benefitting patients at risk. To ensure progress in their training, the knowledge and attitudes of assistant nurses need to be investigated and assessed using evidence-based instruments. Therefore, the aim of this study was to evaluate assistant nurses' knowledge of and attitudes towards pressure injuries in the clinical setting and to capture their perceptions of their own educational needs.

3 | METHOD

3.1 | Design

A cross-sectional design, using a validated questionnaire.[22]

3.2 | Setting

The study was conducted at a 600-bed university hospital in Sweden. Data were collected from five different wards, part of the Department of Geriatrics, and the Department of Emergency Care and Internal Medicine.

3.3 | Participants

Assistant nurses undergo specific training, upper secondary school for 3 years to prepare their roles in healthcare. They provide basic patient care under supervision of registered nurses. All assistant nurses in the selected study wards were asked to participate only if they had worked as an assistant nurse for at least 1 month prior to the study. A convenience sample of 88 assistant nurses was included.

3.4 | Instruments

The survey with a learning seminar comprised five parts.

Part one included five questions to collect demographic and professional information regarding the study participants: gender, age, education, years of experience working as an assistant nurse and years of experience working as an assistant nurse at the ward where the study was conducted.

Part two consisted of the PUKAT 2.0 tool[10] to assess pressure injury knowledge. PUKAT 2.0 contains 28 multiple-choice questions, categorised into six themes: aetiology (7 questions), classification and observation (4 questions), risk assessment (2 questions), nutrition (3 questions), prevention (8 questions) and specific patient groups (4 questions). Each question has five response options, including the fifth option of 'I don't know' to discourage guessing. All questions weigh equally in the overall knowledge score, with a maximum score of 28 for each participant, corresponding to a percentage score of 100%. A total knowledge score of 17 or higher (60%) was considered satisfactory, as suggested by the authors proposing the tool.[10]

Part three included the APUP instrument to assess the attitudes of the participants towards pressure injury prevention.[17] This instrument comprises 13 questions, categorised into five factors: (F1) Personal competency to prevent pressure injuries (three items; maximum score = 12); (F2) priority of pressure injury prevention (three items; maximum score = 12); (F3) impact of pressure injuries (three items; maximum score = 12); (F4) responsibility in pressure injury prevention (two items; maximum score = 8); and (F5) confidence in the effectiveness of prevention (two items; maximum score = 8).

Part four contained six open-ended questions regarding pressure injury risk assessment. The following questions were translated from the original Swedish version that was distributed to the participants:

- How do you perform the risk assessment at your ward, and do you personally perform it?
- How many hours after the patient's arrival at the ward do you perform a risk assessment?
- Do you personally document the results of the risk assessment, and if so, where in the electronic health record?
- How do you follow-up on the results of the risk assessment?
- Do you inform the patient about the results of the risk assessment?
- What type of education do you need to improve your knowledge about pressure injuries?

Part five of the survey/learning seminar consisted of an approximately 1.5-h seminar conducted by one of the

study leaders to present the correct answers to part two of the survey/learning seminar regarding the pressure injury knowledge assessment, allowing study participants to ask clarifying questions. Following this educational training, participants were asked two study-specific questions: What do you think about this form of training/education and Did you learn anything new? Please give an example.

3.5 | Data collection procedure

At each session, either the first, third or last author presented the aim of the study and the procedure to the participating assistant nurses. Thereafter, written information was provided, and informed consent was collected from the assistant nurses. After the assistant nurses had signed and returned the informed consent form, they were given the paper survey (containing all five parts). Upon completing the paper survey, the participants handed in their copies to the study author who was present in their group. After all participants had handed in their surveys, the present author guided the participants through all knowledge questions of the PUKAT 2.0 tool, providing the correct answers during a learning seminar. Participants were allowed to ask questions during this phase for clarification.

3.6 | Ethics statement

The heads of both departments at the hospital approved the study. The study was conducted in accordance with the Declaration of Helsinki,[23] as well as the national and local guidelines for research.[24] All assistant nurses received both verbal and written information about the study. Participation was voluntary, and all participants were assured that they could withdraw at any time. All data were treated with confidentiality and stored on a secure server at the university.

3.7 | Data analysis

3.7.1 | PUKAT 2.0 and APUP

Descriptive data are presented in percentages and means. All survey data were entered, cleaned and analysed using Matlab 2021b. Both knowledge and attitude scores were calculated as percentages of the total score. Answers from PUKAT 2.0 were recorded as dichotomous variables: correct (1) vs incorrect (0). If the participant answered, 'I don't know', the answer was interpreted as incorrect (0). The APUP questions (46% positively worded, and 53% negatively worded, stratified within the factor groups) were answered on a Likert scale with a maximum score of 52. Each of the answer possibilities (strongly agree, agree, disagree, strongly disagree) was assigned a numerical value (1,2,3,4) after reversing the scale points for the negatively worded items. A knowledge score of 60% or higher and an attitude score of 75% or higher were deemed satisfactory by the author, who developed the tool.[10,17]

3.7.2 | Open-ended questions and evaluation questions

The data from the open-ended questions and evaluation questions did not allow for qualitative analysis, as almost all participants answered the questions with only one or two words, or one sentence. Therefore, a quantitative content analysis was used.[25] All responses were transferred into one document. The text was read repeatedly to get a sense of the meaning as a whole. Numeric values (e.g., yes = 1/no = 0) were given to the answers as codes, thus allowing for frequencies to be summarised and presented.

4 | RESULTS

4.1 | Demographic characteristics of the participating assistant nurses

There were a total of 88 assistant nurses from five different wards in two departments who participated in the study. The majority of participants were female (84.1%)

TABLE 1 Demographic data for staff ($n = 88$).

	n	%
Gender		
Female	74	84.1%
Male	13	14.8%
Nonbinary	1	1.1%
Department of geriatrics	42	47.7%
Department of emergency care and internal medicine	46	52.3%
	Years range (Md)	
Working as assistant nurse	0–45 years (Median:6)	
Working as assistant nurse at the ward	0–45 years (Median:1.3)	

TABLE 2 PUKAT 2.0 results: Mean (standard deviation) scores in % for participant groups.

	All ($n = 88$)	Emergency care and internal medicine ($n = 46$)	Geriatrics ($n = 42$)	Pos. APUP ($n = 58$)	Neg. APUP ($n = 20$)	Long work experience (≥5 years, $n = 51$)[a]	Short work experience (<5 years, $n = 34$)[a]	'Positive' on Part 4 ($n = 57$)[b]	'Negative' on Part 4 ($n = 31$)[b]
T1. Aetiology	32.5 (15.9)	30.4 (18.2)	34.7 (12.7)	36.2 (14.9)	28.6 (16.7)	31.7 (15.7)	35.3 (15.4)	35.6 (15.8)	26.7 (14.6)
T2. Classification and observation	37.5 (26.8)	38.0 (28.2)	36.9 (25.4)	45.3 (26.3)	22.5 (24.2)	39.2 (24.1)	36.8 (30.9)	40.8 (29.0)	31.5 (21.4)
T3. Risk assessment	47.7 (32.1)	46.7 (32.3)	48.8 (32.2)	50.0 (31.1)	47.5 (30.2)	56.9 (28.3)	32.4 (32.3)	50.9 (32.0)	41.9 (31.9)
T4. Nutrition	52.7 (28.5)	53.6 (32.6)	51.6 (23.5)	57.5 (27.8)	53.3 (27.4)	53.6 (27.6)	50.9 (29.9)	57.9 (24.0)	43.0 (33.5)
T5. Prevention	30.1 (13.6)	27.1 (14.9)	33.3 (11.2)	32.8 (12.7)	27.8 (11.1)	31.4 (13.5)	27.5 (13.5)	31.8 (12.8)	26.9 (14.6)
T6. Specific patient groups	30.7 (24.5)	32.6 (22.9)	28.6 (26.2)	34.5 (24.7)	26.3 (23.6)	34.3 (22.3)	27.9 (26.7)	32.9 (25.1)	26.6 (23.2)
Total	33.8 (11.7)	32.8 (13.1)	34.8 (10.0)	37.8 (10.3)	29.1 (8.6)	35.5 (11.1)	31.9 (12.4)	36.4 (11.1)	28.9 (11.5)

Note: Assistant nurses' attitude scores on pressure injuries.

[a]Three participants did not answer the question about their working experience.

[b]The positive group answered PUKAT 2.0 and provided answers to the open questions, which indicated that they understood the open questions; the negative group provided either no answers or answers that were unrelated to the questions.

with a median age of 40; the demographic characteristics of all participants are shown in Table 1.

4.2 | Assistant nurses' knowledge of pressure injury prevention

A total of 88 assistant nurses completed the PUKAT 2.0 survey with a mean score and standard deviation of 33.8 ± 11.7; see Table 2. Among the six pressure injury knowledge themes, 'Risk Assessment' and 'Nutrition' had the highest mean scores of 47.7 ± 32.1 and 52.7 ± 28.5, respectively, while 'Prevention' and 'Specific Patient Group' had the lowest mean scores of 30.1 ± 13.6 and 30.7 ± 24.5, respectively. The average scores of the individual themes showed a large spread, spanning from 30.1% to 52.7%; see Figure 1 and Table 2. The percentage of participants who reached a knowledge score equal to or higher than the satisfactory score was 3.4% ($n = 3$) of the whole sample ($n = 88$).

4.2.1 | Knowledge score among participants with long and short working experience

Comparison of knowledge scores between the participants with more than 5 years of working experience and those with less than 5 years showed that the assistant nurses with working experience longer than 5 years scored higher than the assistant nurses with work experience less than 5 years, reaching, on average, a total knowledge score of 35.5 ± 11.1% and 31.9 ± 12.4%, respectively; see Table 2.

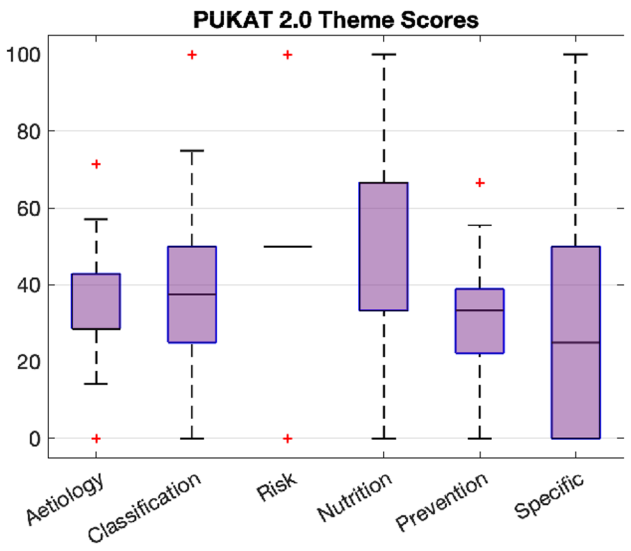

FIGURE 1 Boxplot showing the distribution of scores reached by the participants in the themes of the PUKAT 2.0 knowledge assessment tool (lines in box denote sample median).

4.2.2 | Score among different departments

Participants working at the Department of Geriatrics scored higher (34.8 ± 10.0) in total knowledge compared with the Department of Emergency Care and Internal Medicine (32.8 ± 13.1); see Table 2. The results for the assistant nurses of the two departments showed a large spread, ranging from 17.9% to 60.7% at the Department of Geriatrics, and from 3.6% to 64.3% at the Department of Emergency

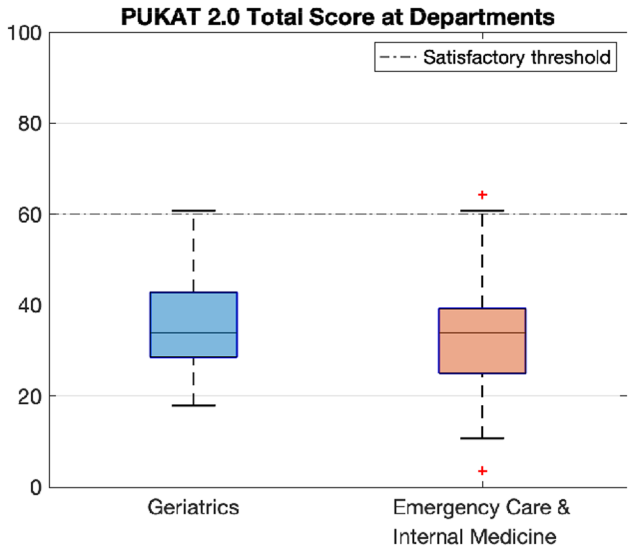

FIGURE 2 Boxplot showing the distribution of total knowledge scores reached by the participants of the Departments of Geriatrics and the Department of Emergency Care and Internal Medicine using PUKAT 2.0 (lines in box denote sample median).

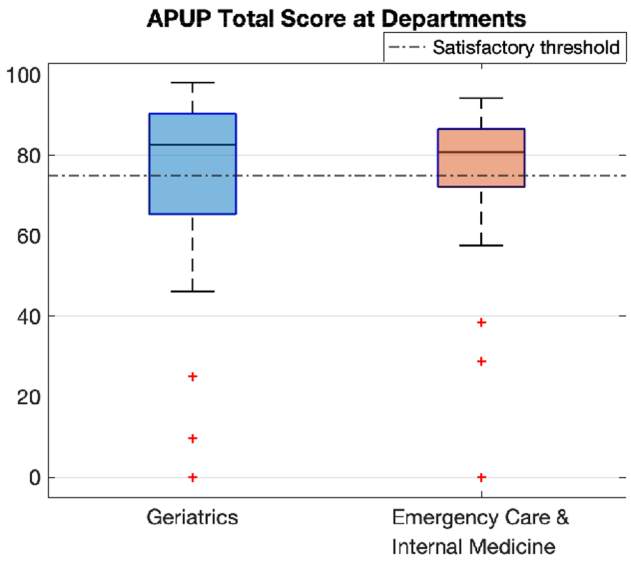

FIGURE 3 Boxplot showing the distribution of scores reached by the participants for the factors of the APUP attitude assessment tool (lines in box denote sample median).

TABLE 3 APUP results: Mean (standard deviation) scores in % for participant groups.

	All ($n = 78$)	Emergency care and Internal Medicine ($n = 38$)	Geriatrics ($n = 40$)	Pos. PUKAT ($n = 3$)	Neg. PUKAT ($n = 75$)	Long Work Experience (≥5 years, $n = 46$)[a]	Short Work Experience (<5 years, $n = 30$)[a]	'Positive' on Part 4 ($n = 57$)[b]	'Negative' on Part 4 ($n = 21$)[b]
F1. Personal competency to prevent pressure injuries	65.3 (17.9)	61.7 (16.2)	69.1 (19.1)	63.9 (19.2)	65.3 (18.0)	65.2 (18.7)	65.3 (17.4)	66.7 (18.0)	61.5 (17.6)
F2 Priority of pressure injury prevention	79.9 (22.3)	82.9 (18.6)	76.8 (25.6)	97.2 (4.8)	79.2 (22.5)	78.4 (22.2)	82.8 (22.8)	83.0 (21.9)	71.4 (21.8)
F3 Impact of pressure injuries	76.3 (25.1)	75.4 (24.4)	77.4 (26.1)	97.2 (4.8)	75.6 (25.2)	78.4 (25.9)	72.5 (23.7)	77.6 (24.2)	73.0 (27.6)
F4 Responsibility in pressure injury prevention	87.0 (20.9)	91.6 (14.8)	82.2 (25.1)	87.5 (0)	87.0 (21.3)	87.8 (17.2)	85.4 (26.1)	90.3 (16.7)	78.0 (27.9)
F5 Confidence in the effectiveness of prevention	87.0 (21.5)	88.1 (20.2)	85.9 (22.9)	95.8 (7.2)	86.7 (21.8)	85.6 (22.1)	88.8 (20.9)	89.5 (16.8)	80.4 (30.3)
Total	77.9 (16.6)	78.4 (13.6)	77.4 (19.5)	87.8 (7.7)	77.5 (16.8)	77.9 (16.6)	77.7 (17.2)	80.1 (15.9)	71.9 (17.5)

[a]Two participants did not answer the question about their working experience.

[b]The positive group answered PUKAT and provided answers to the open-ended questions, which indicated that they understood the open-ended questions. By contrast, the negative group either did not provide any answers or gave answers that were unrelated to the questions.

Care and Internal Medicine; see Figure 2. However, there was no significant difference between the two groups.

4.3 | Attitudes towards pressure injury prevention

Overall, the score regarding attitudes towards pressure injury prevention was positive, being, on average, 77.9 ± 16.6 among all participants who completed the APUP questionnaire ($n = 78$). The participants scored lowest on factor one, 'Personal Competency to Prevent Pressure injuries' (65.3 ± 17.9) and highest on factors four, 'Responsibility in Pressure injury Prevention' (87.0 ± 20.9) and five, 'Confidence in the Effectiveness of Prevention' (87.0 ± 21.5); see Figure 3. There were 58 participants (74.3%) who had an attitude score equal to or higher than 75%, which is considered a satisfactory score; see Table 3.

4.3.1 | Attitudes among participants with long and short working experience

The attitudes towards pressure injury prevention score were slightly higher among those who had worked 5 years and longer (77.9 ± 16.6) compared to those who had worked less than 5 years (77.7 ± 17.2); see Table 3.

4.3.2 | Attitudes among different departments

Participants working at the Department of Emergency Care and Internal Medicine scored higher in attitudes than the participants at the Department of Geriatrics with a mean score of 78.4 ± 13.6, versus 77.4 ± 19.5, respectively; see Table 3. The average scores for the individual factors showed a large spread, ranging from 69.1% to 85.9% at the Department of Geriatrics, and from 61.7% to 91.6% at the Department of Emergency Care and Internal Medicine; Figure 4 and Table 3.

4.4 | Correlation between knowledge and attitude

We did not find a strong correlation between the pressure injury prevention knowledge score and the pressure injury attitude score. Participants who scored high on the PUKAT 2.0 also tended to have high APUP scores; see Figure 5.

The group that had a satisfactory PUKAT score (60% or higher) also showed a satisfactory attitude score, being, on average, of 87.8 ± 7.7. Conversely, the group that had a PUKAT score below the satisfactory threshold also had a lower attitude score, being, on average, 77.5 ± 16.8; see Table 3. Similarly, the group that scored above the satisfactory threshold in the attitude test achieved significantly higher scores in the PUKAT 2.0 test compared to those who scored below the satisfactory threshold in the attitude test (two-sample t-test $p = 0.0011$), reaching,

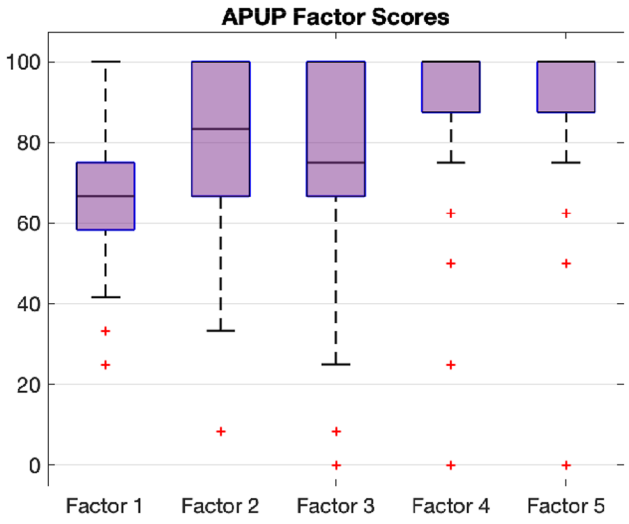

FIGURE 4 Boxplot showing the distribution of scores reached by the Geriatrics and the Emergency and Internal medicine of the APUP attitude assessment tool (lines in box denote sample median).

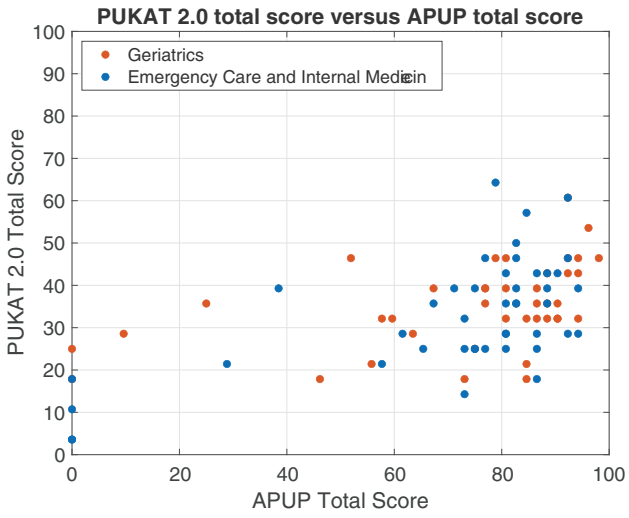

FIGURE 5 Scatter plot showing the relation between the PUKAT 2.0 total score reached by participants and their total APUP score.

on average, a PUKAT 2.0 score of 37.8 ± 10.3 versus 29.1 ± 8.6, respectively.

4.5 | Open-ended questions

Out of 88 participants, 63 responded to one or more of the open-ended questions. Some participants provided more detailed answers covering various topics, while others responded more concisely and distinctly.

1. How do you perform the risk assessment at your ward, and do you personally perform the risk assessment?

The assistant nurses reported performing a skin assessment together with the risk assessment ($n = 38$). The group that reported that it was a collaboration within the team (registered nurse and assistant nurse) ($n = 27$) was nearly as large as the group reported performing the risk assessments independently ($n = 26$). Only a few reported that the registered nurse is solely responsible for the risk assessment ($n = 3$), and two participants reported that they did not know how a risk assessment is performed.

2. How many hours after the patient's arrival at the ward do you perform a risk assessment?

A majority of the assistant nurses reported that the risk assessment is carried out within 24 h ($n = 48$), while a few reported that it depends on the circumstances in the work environment ($n = 3$). One assistant nurse responded that it is carried out after 24 h, and two assistant nurses reported that they do not know.

3. Do you personally document the results of the risk assessment, and if so, where in the electronic health record?

The majority of assistant nurses reported that they personally document the results of the risk assessment ($n = 42$), and 13 reported that they either do not or seldom document in the patient's electronic health record. They reported that they documented the information in the physical examination ($n = 27$), in a care plan ($n = 6$) and 'I don't know' ($n = 9$).

4. How do you follow-up on the results of the risk assessment?

Responses included by reading and/or writing in the patients' electronic record ($n = 21$), using pressure injury prevention methods ($n = 15$), continuing to assess the skin daily ($n = 8$), observing the patient ($n = 8$), communicating within the team ($n = 3$) or referring to the staffing boards for updates ($n = 1$).

Furthermore, they also reported that they updated the risk assessment when there are changes in the patient's physical examination ($n = 5$). However, seven individuals admitted not following up on the results of the risk assessment, no further prevention was planned and three indicated they did not know how to respond.

5. Do you inform the patient about the results of the risk assessment?

Some assistant nurses ($n = 36$) reported that they regularly inform the patient about the results of the risk assessment. Additionally, they reported occasional communication with the patient on this matter ($n = 9$), while others mentioned that they do not inform the patient ($n = 8$).

Two assistant nurses reported uncertainty regarding whether they inform the patient or not.

6. What type of education do you need to improve your knowledge about pressure injuries?

The assistant nurses expressed a need for more education in general about pressure injuries ($n = 53$). They provided specific areas in which they would like to enhance their understanding including how to prevent pressure injuries ($n = 9$), wound dressing and general wound care ($n = 9$), pressure injury categories ($n = 5$), care related to pressure injuries ($n = 1$), pressure injury categorisation ($n = 1$) and the meaning of different words ($n = 1$). A few were uncertain about whether they required further education ($n = 6$).

4.6 | Evaluation of the seminar/training format

The nursing assistants provided the training with very positive feedback ($n = 52$) and emphasised its high educational value ($n = 40$). They particularly appreciated the opportunity to first test their knowledge, followed by group reflection ($n = 15$). Furthermore, they expressed a desire to learn more and requested annual continuing education ($n = 4$). While some participants found the training challenging ($n = 3$) and felt time constraints ($n = 2$), the short duration of the training was positively received by some ($n = 3$).

The nursing assistants described acquiring new knowledge about various risk factors for developing

pressure injuries and how pressure injuries can be prevented ($n = 53$), for example, through mobilisation and suitable nutrition. Several nursing assistants mentioned new knowledge about pressure injuries in general ($n = 14$), as well as new knowledge about different categories of pressure injuries ($n = 7$). Some mentioned new terms, such as cachexia ($n = 3$), and the importance of observing the patient ($n = 2$).

5 | DISCUSSION

This study assessed the knowledge of and attitudes towards pressure injury prevention among assistant nurses in a clinical setting at a university hospital in Sweden. The results highlight a significant knowledge deficiency in pressure injury prevention among the participants. For all but three participants, the knowledge level was deemed unsatisfactory. However, we found that assistant nurses demonstrated satisfactory attitude scores towards pressure injury prevention regardless of the result of the knowledge assessment. The three assistant nurses who reached satisfactory knowledge scores also achieved satisfactory attitude scores, as defined by Beekman et al.,[17] as did the majority of those who did not.

The knowledge gap among assistant nurses revealed in this study was more severe than results found in previous studies assessing healthcare professionals in Sweden. In two earlier studies, Hultin et al. found a mean knowledge score of 49% among assistant nurses in elderly care, and Gunningberg et al. reported a knowledge score of 55.4%.[16,21] One potential explanation for the discrepancy in these results is that, in the study by Hultin et al., 65% of the assistant nurses in elderly care had work experience of 5 years or more. Similarly, in the study by Gunningberg et al., 83.5% of participants had more than 5 years of working experience, with 67% having had more than 10 years of experience.[16] More research is needed to confirm a correlation between work experience and level of knowledge. Another possible explanation for the observed results is a change in the education programme for assistant nurses.

The results of our study are consistent with the findings of De Mayer et al., who reported a mean knowledge score of 35.4% among assistant nurses in Belgium,[9] which is only slightly higher than the 33.8% found in our cohort of assistant nurses. Interestingly, our results show the same pattern regarding the knowledge scores within different themes assessed by PUKAT 2.0. De Mayer et al. reported the highest scores in the theme of nutrition (41.4%) and the lowest scores in the themes of prevention and specific patient groups (28.7% and 23.1%, respectively).[9] This agreement in the findings highlights a consistent trend regarding the weaknesses among assistant nurses beyond the Swedish healthcare system. However, the results show that nurses from the department of geriatrics had higher knowledge scores compared with the nurses of the other wards. It is possible that assistant nurses in this ward are more accustomed to managing pressure injuries because the patients have decreased mobility associated with older age and comorbidity. This is in consistence with previous studies indicating that registered nurses who regularly care for patients with pressure injuries tend to have better knowledge of pressure injuries compared to those who provide sporadic care or have never participated in pressure injury training.[13–16]

The lack of knowledge but positive attitude among the participants in our study is reflected in the open-ended questions, in which the participants explicitly expressed a need and desire for additional education and training, that is, demonstrating an eagerness to improve their knowledge deficiency and improve patient care. This sentiment is confirmed by the findings that even participants with very low knowledge scores still obtained high scores in the attitude-assessing survey. Another possible explanation is that a convenience sample was used in this study. The participants who volunteered were likely motivated by a self-identified need to gain more knowledge about pressure injuries, which could be reflected in their positive attitude.

The identified knowledge gap is consistently validated in the evaluation of the learning seminar that concluded this study, in which the participants reported gaining new insights into pressure injuries and their prevention. Both the open-ended questions and the seminar evaluation highlight a strong demand for more extensive knowledge, implying a clear need for additional training opportunities for assistant nurses. Research has shown that regular training has a positive impact on confidence and competence in pressure injury prevention.[1,13–16] This proactive approach is required to close the existing knowledge gap and ensure improvement in the quality of care provided by assistant nurses. Potential solutions include more educational seminars with follow-up assessments and studies.

During the learning seminar, the authors present observed a notable number of questions from the participants regarding the terminology and formulations used in the survey. Together with the fact that many participants either did not answer the open-ended questions or provided answers that were unrelated to the questions, this suggests that these participants may possess knowledge on assessing pressure injury risk as well as prevention measures, but they may face challenges in comprehending the content of the questionnaires or in

articulating their knowledge effectively due to deficiencies in the Swedish language. This language barrier can limit the assistant nurses' ability to understand, describe or convey relevant instructions and observations in the clinical setting. It might be expected that a high knowledge deficiency results in a higher prevalence of pressure injuries. However, a point prevalence measurement revealed a prevalence of 11% at the university hospital in a previous study,[5] while the national prevalence was found to be 10%. Considering that the prevalence does not reflect the lower performance on the knowledge assessment compared with previous studies, our hypothesis that the language deficiency obscured the true level of knowledge is probable. Nonetheless, patient care may be affected due to information loss in communication, which could be alleviated by additional training and education. This highlights that although knowledge is crucial to pressure injury prevention, as well as other aspects of patient care, other factors need to be taken into consideration and coupled with pressure injury prevalence.

The results from the evaluation of assistant nurses' knowledge and attitudes indicate that participants acquired new insights through this form of training and are open to additional targeted training programmes. The knowledge gaps identified are significant and can have a negative impact on patients, as well as place a high burden on the healthcare system. Therefore, it is essential that strategies are developed at a national level, as well as at a university level, to improve the knowledge and understanding among assistant nurses. A fundamental step is to implement evidence-based training at an organisational level, making education mandatory and available on a reoccurring basis. Registered nurses in Sweden have the primary responsibility for assessing the risk of pressure injuries. However, studies show that they often delegate the pressure injury prevention tasks.[6,19,20] These findings indicate the importance of registered nurses maintaining this responsibility and guiding the nursing care within the team.

5.1 | Strengths and limitations

One limitation of the study is the use of a convenience sample. It cannot be ruled out that a random sample could have yielded different results, as it is possible that the staff who volunteered for the training were biased due to a self-identified need for better pressure injury prevention understanding. Additionally, it would have been valuable to have a follow-up assessment to evaluate the extent of knowledge that was increased and retained. The PUKAT 2.0 and APUP tools have been validated extensively.[9,10] However, some participants found the questions and response alternatives difficult to understand, possibly because of differences in context and practices between Sweden and the other countries (Belgium and Netherlands) where the instruments were validated. Additionally, some participants found the language difficult to understand, as Swedish was not their native language. The survey did not assess the participants' proficiency in Swedish. Nevertheless, all the authors involved in the data collection noticed that many participants asked questions regarding the language, as they did not understand Swedish well. Many of those who did not fill in the attitude questions might not have understood the questions and the answers on the Likert scale, due to the language barriers. Unfortunately, the survey did not include questions about why participants did not provide answers to the questions of the APUP test. The language barrier as a possible cause is solely based on the authors' perception of the situation, constituting a weakness in the study.

6 | CONCLUSION

In conclusion, our study reveals a significant knowledge deficit in pressure injury prediction and prevention. However, the attitudes towards pressure injury prevention were positive among the majority of the participants. Their expressed eagerness for additional knowledge and the recommendation for training in pressure injury prevention underscore the importance of addressing these knowledge gaps in this critical area. Furthermore, registered nurses need to guide the nursing care within the team and keep their responsibility of assessing the risk of pressure injuries.

The findings emphasise the significance of implementing structured training and education programmes in pressure injury prevention. Such initiatives can play a pivotal role in increasing the knowledge of nursing staff, particularly those directly involved in patient care, and in integrating pressure injury prevention into daily nursing routines. Further studies are needed in order to evaluate the effectiveness of recurring structured training programmes through follow-up assessment and to raise the awareness of this knowledge deficit among the heads of the departments.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Charlotte Bjurbo: Data curation; formal analysis; writing – original draft; writing – review and editing. **Elisabeth Wetzer:** Data curation; formal analysis; methodology; software; validation; writing – original draft; writing – review and editing. **David Thunborg:** Data curation; formal analysis; writing – original draft. **Li Zhang:** Writing – original draft; writing – review and editing. **Lisa Hultin:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; validation; visualization; writing – original draft; writing – review and editing.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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