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ORIGINAL ARTICLE

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Swedish translation, cultural adaptation and psychometric evaluation of the pressure ulcer knowledge assessment tool for use in the operating room

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Abstract

The aim of this study was to psychometrically evaluate the Swedish operating room version of PUKAT 2.0. In total, 284 Swedish operating room nurses completed the survey of whom 50 completed the retest. The item difficulty *P*-value of 14 items ranged between 0.38 and 0.96 (median 0.65). Three items were found to be too easy (0.90–0.96). The D-value of 14 items ranged between 0.00 and 0.42 (median 0.46). Three items had a D-value lower than 0.20 (0.11–0.16) and eight items scored higher than 0.40 (0.45–0.61). The quality of the response alternatives (a-value) ranged between 0.00 and 0.42. This showed that nurses with a master's degree had a higher knowledge than nurses with a professional degree (respectively 9.4/14 versus 8.6/14; $t = -2.4$, $df = 199$, $P = 0.02$). The ICC was 0.65 (95% CI 0.45–0.78). The ICCs for the domains varied from 0.12 (95% CI = −0.16–0.39) to 0.59 (95% CI = 0.38–0.75). Results indicated that 11 of the original items contributed to the overall validity. However, the low participation in the test-retest made the reliability of the instrument low. An extended evaluation with a larger sample should be considered in order to confirm aspects of the psychometric properties of this instrument.

KEYWORDS

knowledge, operating room nurse, pressure ulcer, psychometric evaluation, PUKAT2.0

Key Messages

- a Swedish version of the pressure ulcer assessment instrument for use in an operating room (PUKAT OR) was developed and psychometrically validated
- PUKAT OR showed satisfactory psychometric properties, but further studies with a larger sample are needed to confirm the results

- the initial results suggest that continuing education in this area is needed and would be appreciated by OR nurses to provide safe patient care
- future research should include mixed methods to gain a deeper understanding of the knowledge and skills of OR nurses to prevent pressure ulcers

1 | INTRODUCTION

Pressure ulcers (PUs) are a global problem in healthcare. A recent review identified an overall prevalence of 12.8% in hospital settings.[1] In Sweden, nationwide PU prevalence surveys began in 2011 and the prevalence of PUs has varied over the years, from 17% in 2011 to 11.4% in 2020.[2]

The European Pressure Ulcer Advisory Panel (EPUAP) reports that surgery-related PUs occur in relation to 4%–45% of surgical procedures.[3] PUs can occur between 48 and 72 h postoperatively[4] due to prolonged pressure. Moreover, all medical devices in contact with the patient increase the risk of PUs to both skin and mucosa.[3] Therefore, knowledge of the prevention of PUs is crucial.

The prevention of PUs in patients undergoing surgical procedures must take into account complex risk factors and doing so is paramount for ensuring safe patient care in the operating room (OR). In addition to patient-related factors, risk factors within the OR include surgical position,[5] intraoperative medical devices/positioning devices,[6] time on the OR table,[7] anaesthesia and low arterial blood pressure.[8] Moreover, a recent study[9] identified high fasting blood glucose levels before surgery, emergency surgery, some types of vasoactive drugs, and longer surgery duration as predisposing factors for the occurrence of PUs. Longer surgery duration means that patients remain immobile for longer periods which increases the risk for PUs,[10] therefore, deep and multidisciplinary etiological understanding is required for effective prevention of intraoperatively acquired tissue damage.[11]

The OR team members have a key role in protecting the patient using their knowledge of PU prevention and management. There is, however, a lack of awareness of OR-related PUs among OR team members as a possible adverse event. Although the attitudes of OR nurses may be acceptable, their knowledge of PU prevention and management remains inadequate.[12] In addition, nurses ought to understand their role in skin protection and they should perform skin assessments in order to establish a preoperative baseline so that the patient's postoperative skin status may be compared.[7] A recent study[13] found that OR nurses need to improve the prevention and management of OR-related PUs.

A systematic review with a meta-analysis based on the Pressure Ulcer Knowledge Assessment Tool (PUKAT) regarding PU prevention[14] showed that sufficient knowledge regarding PU prevention in emergency departments was dependent on nurses' PU identification and classification skills after training and workshops[15] Another study showed that teaching and scenario simulations were also important factors in optimising the education of OR nurses.[16] The role of scientific evidence in influencing behaviour continues to be debated. The theory of planned behaviour[17] suggests that behaviour is influenced more by attitudes, subjective norms and perceived behavioural control than by knowledge. However, there is ample evidence that more knowledge about PUs leads to safer behaviours.[18]

In order to be able to map OR team knowledge of PUs in Sweden, the Pressure Ulcer Knowledge Assessment Tool (PUKAT 2.0) was developed to measure contextual knowledge about PUs in Swedish. This tool could enable the identification of areas that need strengthening, to ensure patient safety and evidence-based care during surgery in relation to PUs.

The aim of this study was to psychometrically evaluate the Swedish OR version of the PUKAT 2.0.

2 | MATERIAL AND METHODS

2.1 | Study design

A prospective psychometric instrument validation study was designed to translate and validate PUKAT 2.0. The present version consists of 14 items developed specifically for the OR context. The elements included are listed in Table 1.

2.1.1 | Sample and data collection

In order to evaluate the Swedish version of the PUKAT 2.0 OR questionnaire, the Swedish county councils ($n = 21$) were invited to participate by providing the work email addresses of clinically active OR nurses. All clinical OR nurses working in OR departments in Sweden and OR nurses with a managerial role were included in the study. The questionnaire was distributed

TABLE 1 PUKAT 2.0 OR - Domains and items

Domains	Items	
Aetiology	1	What is the cause of pressure ulcers?
	2	A patient undergoes surgery in a semi-upright position (e.g. the head of the operating table at a 60° angle). What happens on sacrum and ischial tuberosities if the patient slides down?
	3	Moist skin (due to e.g., incontinence, wound exudate, irrigation fluid or skin disinfection) and increased body temperature are associated with pressure ulcer development. This statement is.....
	4	Where in the tissue do deep tissue injuries develop during surgery
	5	What type of patients (in terms of body weight) have an increased risk for developing pressure ulcers?
Classification and observation	6	You observe a blister on both heels of a patient following a 3-hour surgical procedure. Which statement is correct?
	7	Which of these pictures is a pressure ulcer category I?
Prevention	8	CASE: A patient is positioned pre-operatively in a Semi-Fowler position (position in which the individual is supine and the head of the operating table is elevated). Which statement is correct?
	9	A patient undergoes surgery in a side-lying position (e.g., hip surgery, lung surgery). Which positioning angle during surgery is associated with the highest risk for developing a pressure ulcer at the trochanter major?
	10	How should surgical linen be used to prevent pressure ulcers?
	11	CASE: Your patient is lying on a pressure redistributing OR mattress. Do you take other measures to prevent pressure ulcers on the heels?
	12	Why is repositioning necessary to prevent pressure ulcers?
	13	Which statement is correct?
	14	Indicate the location on the body where babies have the highest risk of developing a pressure ulcer?

by email together with information about the voluntary nature of the study to 2247 of the estimated 4000 OR nurses in Sweden for whom we got contact information. Of the email addresses provided, 343 were non-functional, leaving 1904 participants eligible for the study. The data was collected between August and September, 2020. The questionnaire was sent to the collected work email addresses with a reminder 1 week later. One week after the reminder, the re-test (the same questionnaire) was sent to all OR nurses who answered the first time. A reminder was also sent out for the re-test at this time. The purpose of the re-test was to investigate test–retest reliability.

2.2 | Ethical considerations

The study was approved by the Ethics Review Board in Linköping, Sweden Dnr 2020-01212. The participant information sheet and a link to the survey were sent as an email. Informed consent was taken from the participants when returning the questionnaire. The anonymity of the participants was guaranteed, and the data were kept confidential in data files on the servers of Ghent University, protected by firewalls, in accordance with Swedish Law of Personal Data Protection (GDPR).

2.2.1 | Instrument development

The Pressure Ulcer Knowledge Assessment Tool (PUKAT), an instrument to assess clinical nurses' knowledge of PUs, was developed in 2010 at Ghent University, Belgium. The original instrument has good overall internal consistency (Cronbach's alpha value = 0.77) and a test–retest correlation coefficient within class = 0.88. This 26-item knowledge instrument was designed to reflect six themes reflecting the most important aspects of PU prevention.[19]

A revised 25-item version of the PUKAT tool (PUKAT 2.0) also showed good psychometric properties for assessing PU prevention knowledge.[20,21] This instrument contains 25 multiple-choice items, each consisting of five response alternatives, including an "I don't know the answer" option. The items were designed to address six themes: Aetiology (6 items), Classification and Observation (4 items), Risk Assessment (2 items), Nutrition (3 items), Pressure Ulcer Prevention (8 items) and Specific Patient Groups (2 items). Responses to the questions were recoded into a dichotomous variable (correct/not correct).

The knowledge instruments have been evaluated in different cultural contexts.[21,22] The original version of the PUKAT was translated from English into Swedish,[23] but

TABLE 2 Overview of the translation and adaptation process

1. Preparation	The research group KFB, CW, CLS, and DB prepared and planned the upcoming process
2. Forward translation	CB, LG, and CB, three bilingual nurse researchers and experts in PU prevention, translated each item independently in the original version of PUKAT 2.0 from English into Swedish in collaboration with the research group. Translation was performed by members of the research group, who were all knowledgeable about English-speaking culture but had Swedish as their primary language. This process was carried out until consensus was reached.
3. Reconciliation	KFB compared and merged three forward translations into a single forward translation until consensus was reached.
4. Back translation	This was carried out by MG, a professional translator, fluent in Swedish and a certified teacher and native speaker of English. The translation was then compared with the original versions by DB.
5. Back translation Review	KFB, the project manager, identified items which had been found to be conceptually problematic and shared translation solutions. The OR expert researcher group, (AvV, BÅ, CLS, CW and KFB) commented independently on the items regarding cultural relevance and suggested which items needed to be clarified or were not relevant in the OR context.
6. Harmonisation	The English and Swedish versions were discussed in the research group in order to reach a consensus on meaning, intelligibility, and relevance for the OR. 13 items were judged to be irrelevant and one item was added, which resulted in a 14-item PUKAT in the Swedish OR version.
7. Cognitive debriefing	The Swedish version was tested with five clinically active OR nurses for face validity, comprehensibility and relevance.
8. Review of Cognitive Debriefing Results and Finalisation	Small adjustments of the instrument were made, based on cognitive debriefings in the research group

the PUKAT 2.0 version of the instrument has not yet been validated in a Swedish context with OR nurses.

2.3 | The validation process

The validation process consisted of two stages.

The first phase of validation was the translation and cultural adaptation of the instrument after approval by the original author of PUKAT. Guidelines comprising 10 steps described by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Task Force were followed for the translation and cultural adaptation process.[24]

Based on feedback from the OR expert group (AvV, BÅ, CLS, CW and KFB) on cultural relevance, the topics in the new PUKAT 2.0 OR were divided into three categories: Aetiology (5 items), Classification and Observation (2 items) and Prevention (7 items). Consistent with the original PUKAT 2.0, it consists of five response alternatives, including an "I do not know the answer" option. An overview of the translation and adaptation processes is given in Table 2.

In the second stage a psychometric instrument validation was conducted. Construct validity, stability, reliability and validity of the multiple-choice test items were evaluated.

3 | STATISTICS

Statistical analyses were performed using the software package IBM SPSS v24.0 (SPSS Inc., Chicago, IL, USA). Components of the knowledge assessment instrument PUKAT 2.0 OR were analysed. Participants' descriptive data are presented in percentages and numbers. A significance level of 0.05 was applied to all statistical tests.

3.1 | Analysis of PUKAT 2.0 OR

3.1.1 | Analysis of the knowledge assessment instrument

Responses to the knowledge assessment instrument were recoded as dichotomous variables (not correct-correct). The option "I do not know the answer" was interpreted as "not correct. The total score on the instrument was calculated as the sum of correct responses (maximum score = 14).

3.1.2 | Validity of the multiple-choice test items

The item difficulty (*P*-value), discrimination index (D-value) and the quality of a response alternative

(a-value) were used to assess the validity of the multiple-choice test items.

The proportion of respondents who answered the item correctly is defined as the difficulty of an item (*P*-value).[25,26] For items with five response options, an item difficulty of $P = .70$ is ideal[27,28] whilst a value of 0.10 was considered too difficult.[20]

The discriminant index (D-value) of the items was calculated by dividing the respondents into two extreme groups: the 27% of respondents with the best performance and the 27% of respondents with the worst performance (high total score versus low total score).[20,25,28] The percentage of correct responses in the 27% worst group was subtracted from the percentage of correct responses in the 27% best group for each item. The D value ranges from +1 to −1. D values in the range between 0.20 and 0.40 are recommended as minimal.[26,27]

The quality of a response alternative (a-value) was assessed by calculating the proportion of respondents who chose the alternative. The optimal a-value for an item with five response options is 0.10. For each item, the a-values must be less than the *P*-value. Equal a-values indicate that all response alternatives function as equal distractors.[20,27]

3.1.3 | Construct validity

Discriminatory power was assessed using the known-groups technique to assess the ability of the instrument to discriminate between groups with theoretically expected different levels of knowledge regarding PUs.[20,30,31] It was hypothesised that groups would differ in knowledge levels based on role, education level, work experience, expertise and preference for receiving pressure ulcer training. The independent samples *t*-test was used to detect differences between the knowledge scores of the predefined groups.[20,31]

3.1.4 | Stability reliability (intraclass correlation)

To evaluate the reliability of the instrument, a test–retest procedure was used. Two random single factorial intraclass correlation coefficients (ICC) were calculated for the overall instrument and for each domain. Reliability coefficients ≥0.70 would be considered satisfactory and coefficients ≥0.80 would be considered preferable.[31]

TABLE 3 Demographics of the participants

	Total ($n = 284$)	
	n	**%**
Gender		
Female	264	93.0
Male	20	7.0
Role in the operating room		
OR nurse	267	94.0
OR nurse with a leading function	11	4.0
Other	5	1.8
No data available	1	0.2
Education		
Professional degree	96	33.8
Bachelor's degree	75	26.4
Master's degree	105	37.0
Doctoral degree	2	0.7
Other	6	2.1
Surgical specialities		
Acute/trauma surgery	8	2.8
General or mixed surgery	117	41.2
Cardiothorac surgery	30	10.6
Gynaecological surgery	13	4.6
Neurosurgery	11	3.9
Orthopaedic (bone and joint) surgery	45	15.9
Otolaryngological and eye surgery	14	4.8
Paediatric (children's) surgery	12	4.1
Plastic and reconstructive surgery	9	3.2
Outpatient surgery	13	4.6
Urological surgery	7	2.5
Other	5	1.8
Work experience in healthcare		
< 5 years	33	11.6
5–10 years	71	25.0
11–20 years	73	25.7
> 20 years	107	37.7
Expertise in pressure ulcers[a]		
Novice	2	0.7
Competent	108	38.0
Proficient	142	50.0
Expert	32	11.3
Would pressure ulcer training be useful?		
Yes	247	87.0
No	37	13.0

[a]Self-estimated expertise in relation to the assessment and management of pressure ulcers (basedon the levels of proficiency defined by Patricia Benner (1982)).

3.1.5 | Internal consistency

The internal consistency was calculated by inter-item correlations of Cronbach's α. Results were interpreted using the criteria for Cronbach's α as defined by[32] (0.70 < Cronbach's α <0.90).

4 | RESULTS

4.1 | Demographic characteristics of the participants

A total of 284 participants (93.0% female, age [mean ± SD] 48.2 ± 9.4 years) completed the first survey (test), of whom 50 (17.61%) also completed the second survey (retest). Most of the participants were OR non-managerial nurses (94.0%) and 63.4% had more than 10 years of professional experience. More than half of the participants (64.1%) had a bachelor's degree or higher and estimated their expertise in PUs as being good or better (61.3%). Of all respondents, 247 (87.0%) indicated that they would find pressure ulcer education useful. A summary of the sample demographics is presented in Table 3.

5 | PSYCHOMETRIC EVALUATION OF THE KNOWLEDGE TOOL

5.1 | Validity of the multiple-choice test items

5.1.1 | Item difficulty

The item difficulty (*P*-value) of 14 items ranged between .38 and .96, with a median value of 0.65. Three items were found to be too easy (0.90–0.96). None of the items had a difficulty index lower than 0.10 (see Table 4).

5.1.2 | Discriminating index

The discriminating index (D-value) of 14 items ranged between 0.11 and 0.61, with a median value of 0.46. Three

TABLE 4 Validity of the multiple-choice test items and stability reliability knowledge tool

	Proportion of respondents choosing each response option[a]									
	Response options									
Domains	Items	a	b	c	d	Do not know[c]	D-value[d]	ICC (95% CI)[e]	Cronbach's α	ICC (95% CI)[e]
Aetiology	1	0.03	0.00	0.04	0.96[c]	0.00	0.11	0.39 (0.13–0.60)	0.56	0.65 (0.45–0.78)
	2	0.05	0.01	0.94[b]	0.00	0.00	0.16			
	3	0.12	0.74[c]	0.02	0.03	0.08	0.45			
	4	0.00	0.38[b]	0.10	0.43	0.09	0.40			
	5	0.00	0.00	0.90[b]	0.07	0.01	0.16			
Classification and observation	6	0.00	0.41[b]	0.12	0.16	0.31	0.61	0.12 (−0.16–0.39)	0.22	
	7	0.10	0.63[b]	0.06	0.01	0.20	0.51			
Prevention	8	0.04	0.03	0.51[b]	NA[f]	0.42	0.57	0.59 (0.38–0.75)	0.74	
	9	0.04	0.06	0.07	0.52[b]	0.31	0.50			
	10	0.57[b]	0.03	0.18	0.02	0.20	0.53			
	11	0.05	0.22	0.41[b]	0.28	0.04	0.53			
	12	0.03	0.28	0.66[b]	0.01	0.03	0.30			
	13	0.00	0.01	0.68[b]	0.24	0.08	0.34			
	14	0.72[b]	0.03	0.01	0.03	0.22	0.47			

[a]Based on the proportion of respondents who did NOT choose the "I do not know the answer" option (= a-value for incorrect response alternatives).
[b]Intraclass correlation coefficient (95% confidence interval).
[c]Correct answer (= *P*-value).
[d]Not applicable.
[e]Proportion of respondents who choose the 'I do not know the answer' option.
[f]Discriminating index.

TABLE 5 Known-groups technique knowledge tool

Groups	*n*	Mean score (SD) (max = 14)	*t*[a]	df[b]	*P*[c]
OR nurse[d] (A)	267	9 (2.2)	−0.40	10.75	.80
versus OR nurse with leading function (B)	11	9.3 (2.3)			
Professional degree (A)	96	8.6 (2.1)	−0.90	169	.40
versus Bachelor's degree (B)	75	8.9 (2.1)			
Bachelor's degree (A)	75	8.9 (2.1)	−1.30	161.6	.20
versus Master's degree (B)	105	9.4 (2.1)			
Professional degree (A)	96	8.6 (2.1)	−2.40	199	.02
versus Master's degree (B)	105	9.4 (2.1)			
≤10 years' work experience (A)	104	9.5 (2.0)	1.60	175	.11
versus > 10 years' work experience (B)	73	9.0 (2.4)			
Non-expert (novice and competent)[e] (A)	110	8.9 (2.9)	−0.65	282	.52
versus Expert (proficient and expert)[e] (B)	174	9.1 (2.1)			
Pressure ulcer training could be useful (B)	147	9.0 (2.2)	−0.39	282	.90
versus Not useful (A)	37	9.0 (1.8)			

Note: (A): Group with theoretically expected lower level of knowledge (B): Group with theoretically expected higher level of knowledge.
[a]Independent sample *t*-test.
[b]Degrees of freedom.
[c]*P*-value.
[d]Operating room.
[e]Self-estimated expertise in relation to the assessment and management of pressure ulcers (based on the levels of proficiency defined by Patricia Benner (1982)).

items had a D-value lower than 0.20 (0.11–0.16) and eight items scored higher than 0.40 (0.45–0.61). None of the items had a negative discriminating index (see Table 4).

5.1.3 | Quality of the response alternatives

The quality of the response alternatives (a-value) ranged between 0.00 and 0.42, with a median value of 0.035. None of the a-values were higher than the *P*-value (see Table 4).

6 | CONSTRUCT VALIDITY

6.1 | Discriminating power

For one group, the scores of participants with a theoretically expected higher level of knowledge were statistically significantly higher than those of the group with a theoretically expected lower level of knowledge. It was found that nurses with a master's degree had a higher level of knowledge than nurses with a professional degree (respectively, 9.4/14 versus 8.6/14; $t = -2.4$, $df = 199$, $P = .02$). No significant differences were found between OR nurses with or without a leadership role, or between nurses with a professional degree with or without a bachelor's degree; between nurses with fewer or more than 10 years of professional experience; between experts and non-experts, or between nurses who would or would not find further education useful (see Table 5).

6.2 | Stability reliability (intraclass correlation)

A total of 50 nurses completed the instrument twice, with a 1-week interval between administrations. The overall intraclass correlation coefficient (ICC) was 0.65 (95% CI = (0.45–0.78)). The ICCs for the domains varied from 0.12 (95% CI = −0.16–0.39) to 0.59 (95% CI = 0.38–0.75) (see Table 4).

7 | DISCUSSION

The purpose of the study was to assess the psychometric properties of the Swedish version of the PUKAT 2.0 OR

for measuring OR nurses' knowledge of pressure ulcer prevention with reference to three specific themes. The first step in the study was to conduct a translation and adaptation process to attempt to ensure that the Swedish version was linguistically and semantically equivalent to the original version of the instrument. The various stages of this process, detailed in Table 1, led to the retention of 14 items from the original instrument of 28 items, with 14 other items having been rejected as irrelevant to the final Swedish PUKAT 2.0 OR version.

In relation to the psychometric evaluation of the available data and the validity of the multiple choice test items, three items were found to be too easy. These were items related to the reasons for PUs developing, the effect of the position of the patients on the operating table on the development of PUs, and the characteristics of patients who are at increased risk for developing PUs. In general, tests to identify item difficulty (the *P*-value) are judged to be more reliable if the *P*-values are spread across a range of 0.0–1.0. This was the case in this study (Table 4).

The same three items also showed low ability to discriminate (D-value) between the groups with theoretically different levels of knowledge. In considering these results, it is gratifying to note that all categories of OR nurses had acceptable knowledge of these specific factors, even if the analysis of these factors does not contribute to the instrument's overall ability to identify areas where there is potential to increase OR nurses' level of knowledge. Therefore, analysis of the instruments indicates that 11 of the original items contributed to the overall validity of the instrument.

In evaluating the quality of the response alternatives, the distribution of the incorrect answers over the response alternatives was measured. None of the a-values were higher than the *P*-value. This indicates that each of the alternative answers served equally well as distractors.

It was possible to discriminate between groups with theoretically lower or higher levels of knowledge by using the instrument, that is, nurses with master's degrees had higher levels of knowledge than those with professional degrees. It was not possible to discriminate between nurses with professional degrees or bachelor's degrees, nurses with differing work experience, expert and non-expert nurses, or nurses who either did or did not express a desire for further education. It may be important to be able to discriminate between levels of knowledge in order to enhance patient safety. A study by Aiken et al. showed that the level of education was important with regard to patient outcome after surgery. The study showed that having nurses with higher education and working in wards was associated with a reduced risk of patient mortality within 30 days of admission.[33]

It was difficult to make feasible judgements about the reliability of the instrument since only 2.6% of the sample completed the instrument twice. It is worth noting that the data collection took place during the 2020 COVID-19 pandemic. During this period, Swedish healthcare was under severe pressure because of the high prevalence and incidence of COVID-19 infections. It may be that there were many absences from work because of illness or because staff were required to work in other departments to cover for ill colleagues and therefore did not have the time or possibility to fill in the questionnaire[34] Low response rates can affect the external validity[35] and, in general, digital questionnaires have a lower response rate than paper versions.[36]

The overall intraclass correlation was 0.65, but the ICCs for the domains were low, ranging from 0.12 to 0.59. In the absence of more reliable data, it is not feasible to speculate about these low values. We can only speculate about the reasons for the low participation in the retest. An extended evaluation of this Swedish version of the PUKAT 2.0 OR instrument is warranted in order to confirm its psychometric properties and, accordingly, its possible utility with Swedish OR nurses.

We suggest further validation of the PUKAT 2.0 instrument, with a particular focus on the research methodology, in order to acquire as much valid and reliable data as possible. The limitations imposed by the COVID-19 pandemic must be addressed. The response rate may have been higher if we had used different survey modalities, such as written reminders being sent to participants instead of email. In addition, if the reminder mode were to be changed from postal to personal contact, perhaps through the head nurses who have knowledge of all the OR nurses working in their departments, there might have been a higher participant response rate.[37]

There were likely elements of sampling and selection bias in the survey, given the low response rates. Participants of web surveys decide whether or not to participate in filling in questionnaires, and as such, the researcher does not have full control of the selection process.[38] In a Cochrane review, it is suggested that in order to increase response rates, questionnaires, letters and emails could be made more personal and preferably kept short.[39]

Analysis of the Swedish OR version of the PUKAT 2.0 gave some tantalising information about how this type of quantitative methodology can contribute to our understanding of OR nurses' knowledge and application of knowledge in the area of PU nursing. Since OR nurses stated that they would like more education in pressure ulcer nursing, it would be valuable to identify areas in which more education is needed and to devise relevant educational strategies for the OR nurses.

Extending future research to include qualitative and quantitative mixed research methods could enable the acquisition of additional valuable data to complement and enhance existing quantitative data.[40] This could help to increase our understanding of how PUs may be prevented.

The desirability of having a reliable and valid Swedish version of the PUKAT 2.0 OR instrument is clear. Its use could enable the identification of areas of knowledge that would benefit from additional pedagogical support. This could support the ultimate goal of improving patient care and patient safety.

8 | CONCLUSION

There is some evidence that the development of a Swedish OR version of the PUKAT 2.0 questionnaire was successful. Operational difficulties during the research process because of the COVID-19 pandemic led to suboptimal response rates of the survey participants in both the test and retest phases of the study. Accordingly, the psychometric properties of the Swedish PUKAT 2.0 OR questionnaire found in this study should be confirmed.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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