J Wound Ostomy Continence Nurs. 2025;52(2):147–152.
Published by Lippincott Williams & Wilkins

Adaptation and Validation of a Turkish Language Version of Braden QD Scale for Predicting Risk of Medical Device-Related Pressure Injuries in Pediatric Patients

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ABSTRACT

PURPOSE: This purpose of this study was to evaluate the validity and reliability of a Turkish language version of the Braden QD Scale for predicting medical device-related pressure injury (MDRPI) risk in pediatric patients.

DESIGN: Validity and reliability study.

SUBJECTS AND SETTING: The sample comprised 71 children in the pediatric intensive care units of a maternity and child hospital; Cengiz Gökçek Maternity and Children's Hospital locates in Gaziantep, Turkey.

METHODS: A Turkish language version of the Braden QD Scale was constructed, and its construct validity and content validity were measured. Several forms of reliability were measured, including internal consistency using Cronbach's alpha coefficient, along with intra-class and interobserver reliability. The sensitivity and specificity of the scale were tested by analyzing a receiver operating characteristics curve. Data were collected from May 1 to May 20, May 2022.

RESULTS: The Braden QD-T had lower (fair) content validity (Kendall's W 0.217, P = .001) and adequate construct validity (Kaiser-Meyer-Olkin [KMO], 0.619; P = .000). It demonstrated excellent internal consistency (Cronbach's alpha 0.878). The intra-class correlation coefficient varied from 0.979 and 1.000, indicating excellent intra-class reliability. The interobserver reliability coefficients varied from acceptable to excellent at 0.661 and 0.984.

CONCLUSION: The Turkish version of the Braden QD Scale for predicting risk of MDRPI in pediatric population was determined to be a valid and reliable risk assessment tool for predicting risk for MDRPI.

KEY WORDS: Braden QD, medical device-related pressure injury, pressure injury, pressure ulcer, risk assessment, validity and reliability.

INTRODUCTION

Medical device-related pressure injury (MDRPI) are wounds formed by the pressure of a medical device or equipment on the skin; they typically form to the shape or pattern of the device.[1] They occur frequently in acute and critically ill children and usually result in a discomfort and prolonged hospital length of stay.[2] Children's skin has a higher moisture content than adult skin, which raises the risk of MDRPI.[3] When compared to adults, the development of hospital-acquired pressure ulcers is 3 times more likely among children who received treatment/care in the pediatric intensive care unit (PICU).[4] The reported incidence of MDRPI in PICUs and neonatal intensive care units ranges between 1% and 27%.[5-9] Ventilacion and colleagues reported that nasal intubation tubes caused 50% of pressure injury formation in PICUs and neonatal intensive care units during a 5-year period in the United Kingdom and Republic of Ireland.[8] Kim and coworkers reported a similar rage of 54.2% of MDRPI caused by intubation tubes, 37.5% attributable to high-flow oxygen cannulas, and 8.3% were caused by saturation probes.[9] Factors that influence the risk of MDRPI outside of use of specific medical devices include the duration of intubation, the child's mobility, the use of medications that alter consciousness such as opioid analgesics, hypotension, and hypoxemia.[10]

A majority of all pressure injuries in acute and critically ill children are MDRPI.[11] The cost of an MDRPI is estimated to vary from $2000 to as high as $700 000 US dollars per injury.[12] Risk assessment is an important component of prevention. An objective assessment of the risks, accurate documentation, and implementation of preventive interventions in at-risk patients are identified as essential for prevention of pressure injuries in the pediatric patients.[11,13]

A systematic review identified 15 studies that evaluated 18 instruments for risk assessment or pressure injury risk.[14] Six of these instruments, the Braden Q, Braden QD, Glamorgan Pediatric Pressure Injury Risk Assessment Scale, Neonatal Skin Risk Assessment Scale, Pediatric Pressure Ulcer Prediction and Evaluation Tool, and Skin Injury Risk Assessment + Prevention were recommended for use by the National Pressure Injury

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The authors report no actual or potential conflicts of interest.

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DOI: 10.1097/WON.0000000000001160

Advisory Panel (NPIAP). While all evaluate pressure injury risk; only 3 were identified as evaluating the risk for MDRPI. They are the Glamorgan Pediatric Pressure Injury Risk Assessment Scale (developed in 2009), Pediatric Pressure Ulcer Prediction and Evaluation Tool Scale (developed in 2015), and the Braden QD (developed in 2018).[15-17] The Braden QD Scale is recommended as an easy-to-use, valid, and reliable risk assessment tool for pressure injuries in children from birth to age 21 years.[17] In a 2019 international directive, the European Pressure Injury Advisory Panel asserted the necessity of pressure injury risk assessment in children using an age-appropriate and validated instrument.[18] Additional recommendations include performing risk assessment as soon as possible after hospitalization, and at most within 8 hours of admission, and reassessment as often as the patient's condition allows, and in the event of any substantial change (therapy, insertion/removal of a device, surgery, etc.).[19-21]

At the time this project was undertaken, no Turkish language instrument for evaluating pressure injury risk in the pediatric population was available. The Braden QD Scale was selected based on a review of the literature. Specifically, we chose the Braden QD because of its validation in children from birth to 21 years and its performance in previous studies evaluating validity and reliability.[17] The purpose of this study was to evaluate the validity and reliability of a Turkish version of the Braden QD Scale for predicting risk of MDRPI in pediatric patients (BQD-T).

METHODS

This study was conducted to determine the validity and reliability of the Turkish version of the Braden QD Scale (Braden QD-T) for predicting risk of MDRPI in pediatric patients. Specifically, we evaluated construct and content validity, along with internal consistency and intra-observer and interobserver reliability.

The target population were children receiving care in the Gaziantep Cengiz Gökçek Maternity and Children Hospital. This hospital is a maternity and children's hospital, located in the southeast region of Turkey. With a bed capacity of 350, it is equipped to provide comprehensive health care services specifically tailored to women and children's medical needs. The sample consisted of a total of 71 patients who were treated, cared for, and followed up in the PICU, emergency pediatric intensive care, CVC (cardiovascular surgery) pediatric intensive care, and palliative care services of the same hospital. Inclusion criteria were all children from birth to age 21 years, who were cared for in the facility's PICU, emergency pediatric intensive care, cardiovascular pediatric intensive care, pediatric surgery intensive care, and palliative care services. Study procedures were reviewed and approved by the Aralik University Ethics committee, and institutional permission was obtained from the Provincial Directorate of Health (approval No. 2022/13-08). The parents of the children who were included in the study gave written, informed consent.

Instrument

We obtained written permission from Martha Curley (the instrument's original developer) to translate it into the Turkish language and evaluate the validity and reliability study of Braden QD-T. In addition, we obtained data from an information questionnaire developed for purposes of this study, which was used to collect demographic and pertinent clinical data from study participants. The information questionnaire comprised 7 items that queried sociodemographic and clinical data related to pressure injury risk.

The Braden QD Scale comprises 7 items that are organized into 3 broad assessment fields.[17] The instrument includes 5 items pertinent to any pressure injury; they are mobility, sensory perception, exposure of the skin to friction and shear, nutrition, and tissue perfusion and oxygenation. Each item is scored between 0 and 2 where a score of 0 indicated no limitation or deficit (lowest risk) and a score of 2 indicates greatest limitation or deficit (highest risk). The remaining 2 items query factors specific to MDRPI are the number of medical devices, and their repositionability. The number of medical devices is scored on a scale of 0 to 8 with 1 point assigned for each medical device. The item that queries repositionability is scored between 0 and 2, where 0 indicates no medical devices, 1 indicates medical devices that can be repositioned or a protective dressing is present underneath devices, and a score of 2 indicates devices that cannot be repositioned or a protective dressing placed underneath it. Cumulative scores range from 0 (lowest risk) to 20 points (greatest risk). A cumulative score of 13 points or above on the scale indicates high risk for pressure injury. The Cronbach's alpha for the original Braden QD was 0.878. Its sensitivity was 86% to 100%, and its specificity was 40% to 59%.[17,22]

The Braden QD-T was developed using a translation, back-translation, and cultural adaptation using techniques described previously and used in prior studies in instruments adapted for the Turkey.[23-25] The Braden QD Scale was translated into Turkish by 2 experts proficient in both languages and familiar with both cultures. Subsequently, a third expert, competent in both Turkish and English and previously unacquainted with the original scale, back-translated it into English. The translated version was administered to 10 nurses (8 female and 2 male) working in the PICU. The aim of this evaluation was to ascertain the comprehensibility of the scale among Turkish nurses. The original and translated versions of the scale were compared by the researchers, leading to the final preparation of the Turkish version of the Braden QD (Braden QDT). The finalized version of the scale was sent to Martha AQ Curley, the instrument's original developer.

Study Procedures

The researchers and 2 nurses collected data through observation between May 1 and May 21, 2022. In addition to the researchers, the charge nurse of the PICU was asked to identify 2 nurses who had a bachelor's degree and worked in the unit for at least 1 year. The researchers ascertained the nurse data collectors' willingness to participate in the project and provided face-to-face training for approximately 30 minutes regarding the objective of the study, Braden QD-T scale content, and its completion. Each child was assessed simultaneously and independently by the researcher and 2 nurses 1 day after that training. A total of 71 children were assessed during data collection; the evaluation for each participant required approximately 5 minutes. Patients whose clinical status did not change were evaluated for the second time by the same investigator and nurse 72 hours after the first evaluation.

Data Analysis

Statistical analysis were completed using SPSS software, version 25 (SPSS Inc) and LISREL software version 8.80 (Scientific Software International, Inc). The Kendall's W test was used to analyze content validity. Explanatory factor analysis (EFA),

confirmatory factor analysis (CFA), and CFA fit indices were used to analyze construct validity. Before factor analysis, the adequacy of our sample size for factor analysis was calculated using the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. Cronbach's alpha coefficient was e = used to analyze the internal consistency of the Braden QD-T. Item-total score correlation coefficients were used to determine the effect of each item on the total score. Intra- and Inter-class correlations were assessed at 2 different times. The receiver operating characteristics (ROC) curve was used to analyze the distinguishing feature of the scale for pressure injury risk. The cutoff point was calculated for the area under the ROC curve (AUC) and the total score on the scale to evaluate if the scoring might be distinguished.

RESULTS

The sample comprised 71 children patients who satisfied the inclusion criteria; no parents declined study participation. The mean age of the participants was 3.28 (SD = 3.13) years, the average days of hospitalization was 50.90 (SD = 60.25) days, and the mean body weight was 13.64 (SD = 10.36) kg. Slightly more than half (54.9%, n = 39) were female, 49.3% (n = 35) were hospitalized in the PICU, 69.0% (n = 49) were fed parenterally, 49.3% (n = 35) were able to move independently, and 49.3% (n = 35) were bedridden (Table 1).

Validity of the Braden QD-T

Table 2 summarizes analyses of the content and construct of the Braden QD-T. Content validity was evaluated using Kendall's W. The Kendall's W test coefficient was 0.217, P = .000), indicating low content validity. In contrast, outcomes of the EFA and fit indices of the CFA were more robust. Specifically, the KMO was 0.619, indicating adequate EFA. The Goodness of Fit Index (GFI) was robust at 0.96, and the adjusted GFI (AGFI) was 0.93. Additional fit indices varied from 0.82 to 0.95, indicating robust construct validity.

TABLE 1.
Clinical and Demographic Characteristics of Participants

Characteristics	Mean or SD	Min	Max
Age, y	3.28 (3.13)	1	15
Hospital LOS	50.90 (60.25)	3	240
Body weight	13.647 (10.36)	2	65
		n	%
Sex	Female	39	54.9
	Male	32	45.1
Care Unit	PICU*	35	49.3
	Emergency pediatric intensive care	16	22.5
	CVS pediatric intensive care	9	12.7
	Pediatric surgery intensive care	4	5.6
	Palliative care	7	9.9
Feeding	Oral	21	29.6
	Parenteral	49	69.0
	Other	1	1.4
Mobility	Able to move independently	35	49.3
	Bedridden	35	49.3
	Able to sit-lie down	1	1.4

Abbreviation: PICU, pediatric intensive care unit.

TABLE 2.
Validity Analysis of Braden QD-T

Analyses		Results
Content validity analysis		Kendall's W test: 0.217
		Chi-square: 52.029
		P = .001
Construct validity analysis	Exploratory factor analysis	Kaiser-Meyer-Olkin: 0.619
		Chi-square: 165.286
		P = .000
	Fit indices of confirmatory factor analysis	In the study, following values were found: x^2/degree of freedom: 15.47/14 = 1.11
		P value = .347
		GFI: 0.96
		AGFI: 0.93
		CFI: 0.95
		NFI: 0.82
		NNFI: 0.93
		RMR: 0.013
		SRMR: 0.069
		RMSEA: 0.031

Abbreviations: AGFI, adjusted Goodness of Fit Index; CFI, Comparative Fit Index; GFI, Goodness of Fit Index; NFI, Normed Fit Index; NNFI, Non-Normed Fit Index; RMR, root mean square residual; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

Reliability of the Braden QD-T

To determine the adequacy of the sample size for the use of EFA, the validity and reliability of the scales were assessed using the Bartlett's test of Sphericity and KMO. The Bartlett's test of Sphericity for factor analysis should be statistically significant, and the KMO value should be higher than 0.60.[26-28] Analysis of findings from this study revealed a KMO value of 0.619 and a P value for Bartlett's test for Sphericity of .001. These findings indicate that data are suitable for factor analysis (Table 2).

The intra-class correlation coefficients (ICC) between the paired observations in the first and second assessments were between 0.979 and 1.000; this finding indicates excellent intra-class reliability (Table 4). Table 5 summarizes the inter-observer reliability between the 2 PICU nurses and researcher. Individual item ICC varied from 0.661 to 0.983; cumulative ICC varied from 0.983 to 0.989. These values indicate excellent interobserver reliability.

The Cronbach's alpha value of the Braden QD-T was 0.88, and the Cronbach alpha on individual items varied from 0.87 to 0.88. These findings indicate that the Braden QD-T has good internal consistency (Table 3).

Receiver Operating Characteristics Curve of Braden QD-T

The ROC was used to examine the predictive power of the Braden QD-T and to determine the cutoff point for assessment of the risk level (Figure 1).[15,17] The AUC was 1.000 (95% CI, 0.94-1.00), and the cutoff point for the total score

TABLE 3.
Total Item Mean Score and Cronbach's Alpha Coefficients of Braden QD-T

	Cronbach's Alpha	Observer 1 Mean or SD	Observer 2 Mean or SD	Observer 3 Mean or SD	Mean Score		
					Mean	Min	Max
Mobility	0.87	1.01 (0.82)	0.97 (0.79)	1.01 (0.81)	1.00	0.97	1.01
Sensory perception	0.87	0.77 (0.61)	0.79 (0.58)	0.79 (0.61)	0.78	0.77	0.78
Friction and shear	0.87	0.97 (0.38)	1.01 (0.43)	1.03 (0.41)	1.00	0.97	1.02
Nutrition	0.87	0.55 (0.63)	0.48 (0.63)	0.51(0.58)	0.51	0.47	0.54
Tissue perfusion and oxygenation	0.87	0.37 (0.54)	0.48 (0.56)	0.41 (0.55)	0.41	0.36	0.47
Number of medical devices	0.86	5.18 (1.73)	5.15 (1.74)	5.14 (1.7)	5.16	5.14	5.18
Repositioning/Skin protection	0.88	1.00 (0.17)	0.98 (0.12)	0.98 (0.12)	0.99	0.98	1.00
Total	0.88	9.83 (3.23)	9.84 (3.22)	9.84 (3.21)	9.84	9.8	9.84

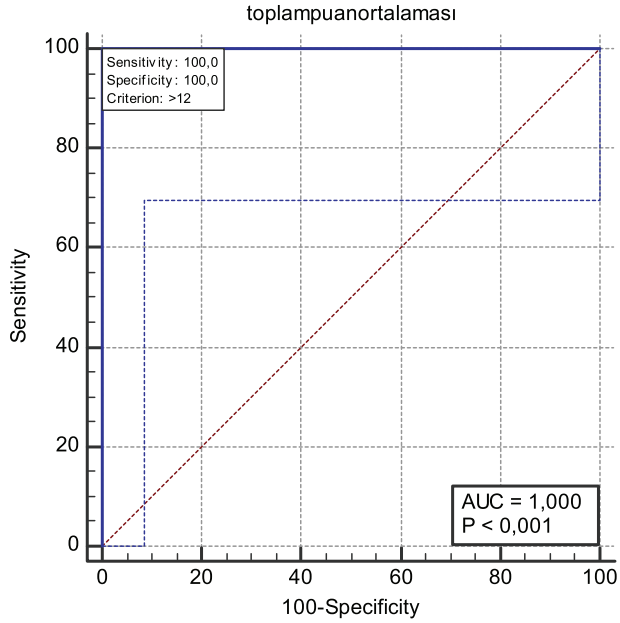
of the Braden QT was 12.00 (sensitivity, 100.00%; 95% CI, 0.76-1.00; Specificity, 100.00%; 95% CI, 93.6-100.00). These findings indicate that the Braden QD-T possesses an excellent level of success in predicting MDRPI risk in this sample.

DISCUSSION

Using translation, back-translation, and cultural adaptation, we constructed a Turkish language version of the Braden QT. Two forms of validity, content and construct validity were evaluated. The findings indicate low levels of agreement between content experts, yielding a Kendall's W of 0.217. In contrast, construct validity was more robust with an acceptable EFA of 0.619 and excellent CFA indices of 0.92-0.96.

The CFA and fit indices used for the study indicated a high level of fit. If the χ^2/degree of freedom from these fit indices is less than 3 at the beginning, the fit may be described as perfect.[29] In this study, the χ^2 value was found to be 1.11, indicating a perfect fit. In addition, we completed multiple fit indices.[25,29-31] The GFI, AGFI, Comparative Fit Index, Normed Fit Index, Non-Normed Fit Index (NNFI), root mean square residual, standardized root mean square residual, and root mean square error of approximation are the most frequently used fit indices (Table 2). A GFI value of higher than 0.95 indicates a perfect fit. The AGFI, Comparative Fit Index, and NNFI values were >0.90, indicating a good fit. Similarly, the root mean square residual and root mean square error of approximation values were less than 0.05, indicating a good fit, whereas the standardized root mean square residual of <0.08 was less robust. Nevertheless, this value indicated an acceptable fit.

The reliability of the Braden QD-T instrument is comparable to previously reported values, which were



Area Under Curve (AUC)	Std. Error	p	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
1.000	0.000	0.001	0.949	1.000

Figure 1. ROC curve. ROC indicates receiver operating characteristics.

TABLE 4.
Consistency Between First and Second Assessment Mean Scores of the Observers

	ICC Value	95%		*P* Value
Mobility	0.979	0.961	0.989	.000
Sensory perception	0.987	0.975	0.993	.000
Friction and shear	0.992	0.985	0.996	.000
Nutrition	0.983	0.968	0.991	.000
Tissue perfusion and oxygenation	0.979	0.960	0.989	.000
Number of medical devices	0.980	0.962	0.989	.000
Repositioning/Skin protection	1.000	1.000	1.000	
Total	0.996	0.993	0.998	.000

Abbreviation: ICC, intra-class correlation coefficient.

reported using the original Braden QD-T. Specifically, Puspitasari and colleagues reported Cronbach alpha coefficients of 0.76 and 0.83.[22] The Cronbach's alpha value of the Braden QD-T in our study was 0.88. The analysis also identified that intra-class coefficients were also robust. They varied from 0.98 to 1.00, indicating excellent intra-observer consistency (Table 4).[25] The interobserver ICC varies from 0.661 to 0.984 (Table 5). These values indicated good to excellent interobserver reliability between the 2 nurse data collectors and the researcher.[32]

One of the important concepts used in the ROC curve method is AUC.[33-35] The area below the ROC curve identifies the accuracy of the test in distinguishing between patients at risk from those not at risk. An AUC value between 0.50 and 1.00 and the size of the value (area) suggest that the test distinguishes the person at risk from the individual not at risk. The AUC in our analysis was 1.000 (Figure 1); this value indicates the cutoff point, and the actual circumstance indicates an excellent fit. Fleming and colleagues evaluated the ability of the Braden QD-T Scale to measure MDRPI risk in children; they observed that the anticipated predictive value of the Braden QD was impaired by reduced incidence of MDRPI and that the use of a cutoff point of 13 or higher may diminish the performances of specificity and sensitivity.[36] The cutoff point in our study was 12.00; this value is based on an AUC value of 1.000, a standard error of 0.000, and a sensitivity and specificity of 100% (Figure 1). Additional research is needed to determine the performance of the Braden QD-T following the implementation of MDRPI prevention initiatives.

The AUC in this study was high at 1.000 (95% CI, 0.94-1.00), and the instrument's specificity and sensitivity were robust at 100%, respectively. Curley and coworkers found that the Braden QD Scale determined a sensitivity of 0.86 and a specificity of 0.59 in predicting the MDRPI in pediatric patients.[17] It was reported that the items on the scale showed a good performance with AUC: 0.78 (95%0.73-0.84). An evaluation of the validity and reliability of a Turkish language version of the Glamorgan Pediatric Pressure Injury Risk Assessment Scale, which also includes items related to MDRPI risk, reported a sensitivity of 98.4% and a specificity of 67.4%.[15]

TABLE 5.
Interobserver Reliability

	Items	ICC Value	95%		*P* Value
Observer-1	Mobility	0.973	0.950	0.985	<.001
	Sensory perception	0.924	0.863	0.959	<.001
	Friction and shear	0.909	0.837	0.950	<.001
	Feeding	0.888	0.802	0.938	<.001
	Tissue perfusion and oxygenation	0.854	0.745	0.919	<.001
	Number of medical devices	0.829	0.703	0.904	<.001
	Repositioning/Skin protection	0.672	0.465	0.809	<.001
	Total	0.989	0.979	0.994	<.001
Observer-2	Mobility	0.971	0.947	0.984	<.001
	Sensory perception	0.881	0.789	0.934	<.001
	Friction and tear	0.935	0.882	0.964	<.001
	Feeding	0.881	0.789	0.934	<.001
	Tissue perfusion and oxygenation	0.932	0.878	0.963	<.001
	Number of medical devices	0.967	0.939	0.982	<.001
	Repositioning/Skin protection	0.661	0.450	0.802	<.001
	Total	0.983	0.968	0.991	<.001
Observer-3	Mobility	0.867	0.767	0.927	<.001
	Sensory perception	0.909	0.837	0.950	<.001
	Friction and tear	0.935	0.882	0.964	<.001
	Feeding	0.839	0.720	0.910	<.001
	Tissue perfusion and oxygenation	0.966	0.938	0.982	<.001
	Number of medical devices	0.975	0.954	0.982	<.001
	Repositioning/Skin protection	0.661	0.450	0.802	<.001
	Total	0.984	0.970	0.989	<.001

Abbreviation: ICC, intra-class correlation coefficient.

LIMITATIONS

Limitations of this study include the collection of the sample from only a single hospital and the natural restriction of the observation results due to the personal knowledge and skill levels of the researchers and nurses involved. Intra-class and interobserver reliability ratings were limited to 3 data collectors, a researcher, and 2 trained PICU nurses.

CONCLUSIONS

A valid and reliable assessment tool is needed to determine MDRPI risk in pediatric patients. While several instruments for measuring pressure injury risk have been developed or adapted for use in Turkey, no risk assessment scale was available assessment of MDRPI in the pediatric

population. We developed and evaluated the Braden QD-T and believe it will be of clinical value in identifying children at risk for MDRPI, along with providing guidance for implementation of preventive interventions. We assert that the Braden QD-T should be tested in multisite and larger samples in order to more fully evaluate its ability to predict risk for MDRPI and all pressure injuries in the pediatric population.

REFERENCES

1. Edsberg LE, Black JM, Goldberg M, McNichol L, Moore L, Sieggreen M. Revised National Pressure Ulcer Advisory Panel pressure injury staging system: revised pressure injury staging system. *J Wound, Ostomy Contin Nurs*. 2016;43(6):585-597. doi:10.1097/WON.0000000000000281.
2. Freundlich K. Pressure injuries in medically complex children: a review. *Children (Basel)*. 2017;4(4):E25. doi:10.3390/children4040025.
3. Liao Y, Gao G, Mo L. Predictive accuracy of the Braden Q Scale in risk assessment for paediatric pressure ulcer: a meta-analysis. *Int J Nurs Sci*. 2018;5(4):419-426. doi:10.1016/j.ijnss.2018.08.003.
4. Razmus I. Factors associated with pediatric hospital-acquired pressure injuries. *J Wound Ostomy Continence Nurs*. 2018;45(2):107-116. doi:10.1097/WON.0000000000000411.
5. Curley MAQ, Quigley SM, Lin M. Pressure ulcers in pediatric intensive care: incidence and associated factors. *Pediatr Crit Care Med*. 2003;4(3):284-290. doi:10.1097/01.PCC.0000075559.55920.36.
6. Schlüer AB, Cignacco E, Müller M, Halfens RJ. The prevalence of pressure ulcers in four paediatric institutions. *J Clin Nurs*. 2009;18(23):3244-3252. doi:10.1111/j.1365-2702.2009.02951.x.
7. Kohr LM, Curley MAQ. Small study finds 27.7% prevalence of pressure ulcers in paediatric hospitals in Switzerland, with many cases caused by external medical devices. *Evid Based Nurs*. 2010;13(2):58. doi:10.1136/ebn1051.
8. Ventilacion IMC, Thruston IM, Lynch F, Durward A, Tibby S. Nasal pressure ulcers: a national survey of current practice and occurrence in paediatric and neonatal. *Arch Dis Child*. 2008;93(Suppl 2):ps403–ps403. https://adc.bmj.com/content/93/Suppl_2/ps403.
9. Kim HK, Kim Y, Son HM. Characteristics influencing the occurrence of respiratory medical device-related pressure ulcers in the pediatric intensive care unit. *Child Health Nurs Res*. 2019;25(2):133-142. doi:10.4094/chnr.2019.25.2.133.
10. Martínez MJA, Lorente MMS, Vidal LA, et al. Relación de autores, colaboradores y revisores. Published online 2012:271.
11. Butler CT. Pediatric skin care: guidelines for assessment, prevention, and treatment. *Dermatol Nurs*. 2007;19(5):471-472,477–482,485.
12. Coomer NM, Kandilov AMG. Impact of hospital-acquired conditions on financial liabilities for Medicare patients. *Am J Infect Control*. 2016;44(11):1326-1334. doi:10.1016/j.ajic.2016.03.025.
13. Törüner EK, Büyükgönenç L, Altay N Pressure ulcers in children. Published online 2011:7.
14. Delmore B, Deppisch M, Sylvia C, Luna-Anderson C, Nie AM. Pressure injuries in the pediatric population: a National Pressure Ulcer Advisory Panel white paper. *Adv Skin Wound Care*. 2019;32(9):394-408. doi:10.1097/01.ASW.0000577124.58253.66.
15. Saçar Ç, Öztürk C, Bektaş M. Glamorgan pediatric pressure ulcer risk diagnosis scale Turkish form psychometric properties. *J Intensive Care Nurs*. 2013;17(2):45-51. https://dergipark.org.tr/en/pub/ybhd/issue/26501/278841.
16. Sterken DJ, Mooney J, Ropele D, Kett A, Laan KJV. Become the PPUPET master: mastering pressure ulcer risk assessment with the Pediatric Pressure Ulcer Prediction and Evaluation Tool (PPUPET). *J Pediatr Nurs: Nurs Care of Child Fam*. 2015;30(4):598-610. doi:10.1016/j.pedn.2014.10.004.
17. Curley MAQ, Hasbani NR, Quigley SM, et al. Predicting pressure injury risk in pediatric patients: the Braden QD scale. *J Pediatr*. 2018;192(1):189-195.e2. doi:10.1016/j.jpeds.2017.09.045.
18. Qrg-2019-turkish.pdf. Accessed February 8, 2022. https://www.epuap.org/wp-content/uploads/2021/01/qrg-2019-turkish.pdf
19. Kottner J, Cuddigan J, Carville K, et al. Prevention and treatment of pressure ulcers/injuries: the protocol for the second update of the international Clinical Practice Guideline 2019. *J Tissue Viability*. 2019;28(2):51-58. doi:10.1016/j.jtv.2019.01.001.
20. Chamblee TB, Pasek TA, Caillouette CN, Stellar JJ, Quigley SM, Curley MAQ. CE: how to predict pediatric pressure injury risk with the Braden QD scale. *Am J Nurs*. 2018;118(11):34-43. doi:10.1097/01.NAJ.0000547638.92908.de.
21. Kulik LA, Hasbani NR, Stellar JJ, et al. Hospital-acquired pressure injuries in children with congenital heart disease: prevalence and associated factors. *Pediatr Crit Care Med*. 2019;20(11):1048-1056. doi:10.1097/PCC.0000000000002077.
22. Puspitasari JD, Nurhaeni N, Waluyanti FT. Testing of Braden QD Scale for predicting pressure ulcer risk in the pediatric intensive care unit. *Pediatr Rep*. 2020;12(Suppl 1):8694. doi:10.4081/pr.2020.8694.
23. Hilton A, Skrutkowski M. Translating instruments into other languages: development and testing processes. *Cancer Nurs*. 2002;25(1):1-7. doi:10.1097/00002820-200202000-00001.
24. Karahan A, Toruner EK, Ceylan A, Abbasoglu A, Tekindal A, Buyukgonenc L. Reliability and validity of a Turkish language version of the Bates-Jensen wound assessment tool. *J Wound Ostomy Continence Nurs*. 2014;41(4):340-344. doi:10.1097/WON.0000000000000036.
25. Nunes MLG, Martins L, Conceição de Gouveia Santos VL. Cultural adaptation and validation of the ostomy skin tool to the Brazilian Portuguese. *J Wound Ostomy Contin Nurs*. 2023;50(2):124-130. doi:10.1097/WON.0000000000000949.
26. Devellis RF. Scale development: theory and applications. 4th ed. Sage Publications; 2016.
27. Johnson B. *Educational Research: Quantitative, Qualitative, and Mixed Approaches*. Fifth ed. Sage Publications; 2014.
28. Terwee CB, Bot SDM, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol*. 2007;60(1):34-42. doi:10.1016/j.jclinepi.2006.03.012.
29. Büyüköztürk YŞ, Bökeoğlu ÖÇ, Şekercioğlu G. Multivariate statistics SPSS and LISREL applications for social sciences. *Pegem Akademi Yayincilik*. 2012;25–100.
30. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling: A Multidiscip J*. 1999;6(1):1-55. doi:10.1080/10705519909540118.
31. de G Santos VLC, Gomboski G, de O Freitas N, Grant M. Adaptation of the city of hope-quality of life-ostomy questionnaire from English to Brazilian Portuguese: a validation study. *J Wound Ostomy Contin Nurs*. 2021;48(1):44. doi:10.1097/WON.0000000000000727.
32. Herting MM, Gautam P, Chen Z, Mezher A, Vetter NC. Test-retest reliability of longitudinal task-based fMRI: implications for developmental studies. *Dev Cogn Neurosci*. 2018;33:17-26. doi:10.1016/j.dcn.2017.07.001.
33. Hoo ZH, Candlish J, Teare D. What is an ROC curve? *Emerg Med J*. 2017;34(6):357-359. doi:10.1136/emermed-2017-206735.
34. Kamarudin AN, Cox T, Kolamunnage-Dona R. Time-dependent ROC curve analysis in medical research: current methods and applications. *BMC Med Res Methodol*. 2017;17(1):53. doi:10.1186/s12874-017-0332-6.
35. Kiliç S. Klinik karar vermede ROC analizi. *Journal of Mood Disorders*. 2013;3(3):135-140. doi:10.5455/jmood.20130830051624.
36. Fleming SL, McFarlane KH, Thapa I, et al. Performance of a commonly used pressure injury risk model under changing incidence. *The Joint Commission Journal on Quality and Patient Safety*. 2022;48(3):131-138. doi:10.1016/j.jcjq.2021.10.008.