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ORIGINAL ARTICLE

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PURPOSE T in Swedish hospital wards and nursing homes: A psychometric evaluation of a new pressure ulcer risk assessment instrument

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Abstract

Aim: To evaluate the psychometric characteristics of the Pressure Ulcer Risk Primary or Secondary Evaluation Tool (PURPOSE T); reliability (inter-rater and test–retest) and validity (convergent validity) in a Swedish context.

Background: Pressure ulcers are considered as an adverse event and are a problem in healthcare worldwide. The first step in pressure ulcer prevention is to identify patients that are at risk. PURPOSE T is a new pressure ulcer risk assessment instrument that was developed in the UK using "golden standard" instrument method.

Design: Observational, descriptive and comparative.

Methods: A total of 235 patients and 28 registered nurses were recruited (May 2018–November 2018) from six hospital wards at a university hospital and two community nursing homes in Sweden. Blinded (ward/nursing home nurses and expert nurses) PURPOSE T assessments and follow-up retests were undertaken. Cross-tabulation and kappa statistics were used to examine the reliability, and phi correlation was used to test the convergent validity. The study followed the STROBE guideline.

Results: The clinical evaluation showed "very good" (kappa) inter-rater and test–retest reliability for PURPOSE T assessment decision overall. The agreement of "at risk"/"not at risk" for both inter-rater and test–retest was also high, at least 95.5%. The convergent validity between PURPOSE T and other traditional assessment instruments was moderate.

Conclusion: The evaluation of PURPOSE T demonstrated good psychometric characteristics. Further research is needed to evaluate PURPOSE T's usability among registered nurses.

Relevance to clinical practice: There is a lack of evidence-based validated pressure ulcer risk assessment instruments for use in health care. According to our findings, the Swedish version of PURPOSE T could be used in hospitals and nursing homes to identify patients in risk or with pressure ulcers.

KEYWORDS
evaluation, nursing, pressure ulcer, primary prevention, reliability, risk assessment, secondary prevention, validity

1 | INTRODUCTION

Pressure ulcers are a problem in healthcare worldwide, with a variation in prevalence of 0%–46% in hospital settings and are regarded as a quality indicator (National Pressure Ulcer Advisory Panel, 2019). Pressure ulcers cause suffering for the patient (Gorecki, Brown, Nelson, & Briggs, 2009; Gorecki, Nixon, Madill, Firth, & Brown, 2012) and have huge economic impact on healthcare organisations (Bennett, Dealey, & Posnett, 2004; Dealey, Posnett, & Walker, 2012; Demarré, Van Lancker, Van Hecke, & Verhaeghe, 2015). A recent review of 64,917 hospital admissions demonstrated that 91% of the pressure ulcers are preventable. Patients with hospital-acquired pressure ulcers have an extended length of stay at hospital, with an average of 15.8 days (Gunningberg, Sving, Hommel, & Ålenius, 2019). The first step in pressure ulcer prevention is to identify patients at risk; in practice, this is supported by the use of pressure ulcer risk assessment instrument (PU-RAI) (National Pressure Ulcer Advisory Panel, 2019).

What does this paper contribute to the wider global clinical community?

- PURPOSE T demonstrated good psychometric characteristics: (inter-rater and test–retest reliability and convergent validity).
- PURPOSE T identifies more patients at risk of pressure ulcers and patients with pressure ulcers compared to the modified Norton Scale and the Braden Scale.
- PURPOSE T offers a possibility for registered nurses worldwide to work with an evidence-based risk assessment instrument.

2 | BACKGROUND

The latest evidence based on international guidelines recommend PU-RAIs should include mobility, skin inspection and circulation (National Pressure Ulcer Advisory Panel, 2019). Since the 1960s, over forty PU-RAIs have been developed (Coleman et al., 2013). These are often limited in their methodological development and practical foundation (Coleman et al., 2013; Gould, Goldstone, Gammon, Kelly, & Maidwell, 2002; Kottner & Balzer, 2010). It has been argued that PU-RAIs need to be developed on the basis of multivariable analysis to identify factors that are independently associated with development of pressure ulcers (National Pressure Ulcer Advisory Panel, 2019; Nixon & McGough, 2001). To address conceptual, methodological and practical limitations, Coleman et al. (2013) in the UK developed the Pressure Ulcer Risk Primary or Secondary Evaluation Tool (PURPOSE T) using "golden standard" instrument development methods in a structured five-phase approach: systematic review, consensus study (Coleman, Nelson, Keen, & Wilson, 2014), conceptual framework development (Coleman, Nixon, Keen, & Wilson, 2014), design and pretesting (Coleman et al., 2016) and clinical evaluation (Coleman, Smith, McGinnis, & Keen, 2018).

PURPOSE T is different from traditional PU-RAIs as it incorporates a screening step to enable nurses to quickly screen patients who are clearly not at risk, as well as risk factors informed by systematic review evidence, expert consensus and service-user involvement (Coleman et al., 2013; Coleman, Nixon, et al., 2014; National Pressure Ulcer Advisory Panel, 2019). Rather than numerical scoring, PURPOSE T uses colour to weight risk factors supporting decision-making as to whether the patient is "at risk" and requires primary prevention, "has an existing pressure ulcer" and requires secondary prevention or is "not currently at risk" (Coleman et al., 2018). Coleman et al. (2018) report high reliability agreement in the three-way decision pathway (inter-rater 81.7% and test–retest 92.0%), simple kappa statistics of agreement for PURPOSE T overall (0.71, 0.87); moreover, when classified dichotomously as "at risk/not at risk," there was agreement (93.4%, 95.8%). Convergent validity was reported as moderate to high, associated with other measures of traditional PU-RAI (Coleman et al., 2018).

Two internationally used PU-RAIs are: the modified Norton Scale and the Braden Scale (Lindgren, Unosson, Krantz, & Ek, 2002). In Sweden, the most commonly used PU-RAI is the modified Norton Scale (Lindgren et al., 2002). With these traditional PU-RAIs, the registered nurse (referred to as nurse hereinafter) must undertake a full assessment of all patients, which takes away time from the nurse to do other important care activities. Furthermore, they do not distinguish between the patients that already have a pressure ulcer and those at risk but without a pressure ulcer (Coleman et al., 2018; National Pressure Ulcer Advisory Panel, 2019). The modified Norton Scale and the Braden Scale do not include skin inspection, and they generate a total score that is compared with a reference value to allocate if the patient is "at risk" or "not at risk" (Lindgren et al., 2002). In 2019, the national pressure ulcer prevalence study in Sweden demonstrates that only 54% of the patients who were at risk of pressure ulcers had a risk assessment documented within 24 hr (Measurement of Pressure Ulcer in Health Care, 2019). If patients who are assumed to be at risk are not risk assessed, it is not certain that they will receive adequate prevention.

It is important to use an evidence-based PU-RAI to identify patients with pressure ulcers and those "at risk." The first clinical evaluation of PURPOSE T in the UK reported promising results. However,

it is important to repeat this evaluation in another international healthcare context and to ensure that it is suitable for use in Sweden. To our knowledge, PURPOSE T is not translated and scientifically evaluated outside the UK.

3 | METHODS

3.1 | Aim

The aim of the study was to evaluate the psychometric characteristics of PURPOSE T: reliability (inter-rater and test–retest) and validity (convergent validity) in a Swedish context.

3.2 | Design

An observational, descriptive and comparative design focusing on inter-rater and test–retest reliability, as well as convergent validity (Polit & Beck, 2016). Convergent validity assesses the degree to which constructs (or score on a measure) expected to be related are, in fact related. This study is a replicate of the study by Coleman et al. (2018) using PURPOSE T, the modified Norton Scale and the Braden Scale. The study followed Strengthening the Reporting of Observational studies in Epidemiology guideline (STROBE, see File S1).

3.3 | Participants

Nurses and patients were purposively sampled from a university hospital, including six hospital wards from the departments of geriatric, cardiology, surgery and spinal cord injury and two community nursing homes in Sweden. Our rationale for selecting those wards and nursing homes was to have a variation of nurses' age, work experience and education as well as variation in patients' age and mobility status. Inclusion criteria for ward and nursing home nurses (referred to as staff nurses hereinafter) were that they had >6 months postregistration experience and were willing to participate in the study. The inclusion criteria for patients were that they were ≥18 years of age, and the exclusion criteria were patients at the end of life. Patients were sampled ensuring a similar number of patients from the hospital and nursing homes and representation of patients across four broad risk levels: no mobility restrictions, some mobility/activity limitations, bedfast/chairfast and pressure ulcer category ≥1.

The sample size was calculated using software R and is based on a measurement of reliability, that is the kappa coefficient, k (20). We estimated that approximately 25% of the patients would have no risk for developing a new pressure ulcer and 75% would be at risk of developing a new pressure ulcer or have an existing pressure ulcer. A power calculation was conducted with the following assumptions: a null hypothesis of $k = 0.6$ and alternative $k = 0.8$; alpha = 0.05; and power = 0.9. A total of 221 patients were required in order to detect a statistically significant value of $k \geq 0.8$ (alternative hypothesis) without drop out. We included 235 patients, aiming to include the same number of participants in each of the four groups.

In Sweden, all hospitals and nursing homes have access to national pressure ulcer prevention guidelines (Hommel, Gunningberg, Idvall, & Bååth, 2017), and all hospital wards and nursing homes that were included had access to and should comply with these guidelines. Nurses have the main responsibility for risk assessing the patients. All patients 65 years and older and those who are bedridden or with low mobility should be risk assessed with the modified Norton Scale and have a skin inspection within 24 hr following admittance. Thereafter, all patients found to be at risk for pressure ulcers should receive preventative interventions (Hommel et al., 2017).

3.4 | Data collection

3.4.1 | Instruments

Three types of PU-RAIs were used in the study: PURPOSE T (Coleman et al., 2018), the modified Norton Scale and the Braden Scale (Lindgren et al., 2002).

3.4.2 | PURPOSE T

PURPOSE T uses colours to weight each risk factor item and support decision-making about risk: blue indicates no problem, yellow indicates a potential impact on pressure ulcer risk, orange indicates risk, and pink indicates that the patient has a pressure ulcer or a scar from a previous pressure ulcer. The colour code is integrated throughout a three-step assessment process:

Step 1: Screening assessment that compromises four mobility items (three yellow and one blue), four skin status items (one pink, three yellow and one blue) and two clinical evaluation (one yellow and one blue). This allows the patients who are clearly not at risk (with only blue items) to be quickly screened as a "fast track" and those with potential risk or actually having pressure ulcers proceeding to step two, full assessment (Coleman et al., 2018).
Step 2: Full assessment compromises items for analysis of independent movement (four orange and one yellow), sensory perception (one blue and one orange), moisture (one blue and two yellow), diabetes (one blue and one yellow), circulation (one blue and two orange), nutrition (one blue and four yellow), medical devices (one blue and one yellow), detailed skin assessment (13 skin sites, each with four options relating to: normal skin (blue), vulnerable skin (orange), pain (yellow) or pressure ulcer (pink), and there is option to add further skin site areas, previous pressure ulcer and a reminder figure with the different pressure ulcer categories on how to categorise the pressure ulcers (Coleman et al., 2018).

Step 3: Requires consideration of step 2 to choose one of three assessment decisions compromising "no pressure ulcer—not currently at risk," "no pressure ulcer but at risk" or "pressure ulcer category 1 or above or scarring from previous pressure ulcer." Where only yellow or blue boxes have been ticked, the nurses must consider if the patient is at risk or not; patients with any orange boxes ticked should be allocated to the "no pressure ulcer but at risk" assessment decision, and patients with any pink boxes ticked should be allocated to the "pressure ulcer category 1 or above or scarring from previous pressure ulcer" assessment decision (Coleman et al., 2018).

The final version of PURPOSE T is available at https://ctru.leeds.ac.uk/purpose/purpose-t/

3.4.3 | The modified Norton Scale

The modified Norton Scale incorporates numerical scoring to support decision-making about risk. It includes seven risk factors: general physical condition, mental state, activity, mobility, fluid intake, food intake and incontinence, which allow a score of 1–4 for each, with lower numbers corresponding to increased severity of the risk factor. Each risk factor is added together to give the patients an overall score. This overall score is then compared with a standard reference value allowing the nurse to allocate the patient to "at risk" status or "not at risk" status. A total score ≤20 indicates that a patient is "at risk" for pressure ulcer (Lindgren et al., 2002).

3.4.4 | The Braden Scale

The Braden Scale incorporates numerical scoring to support decision-making about risk. It includes six risk factors: mobility, activity, friction and shear moisture, sensory perception and nutrition and allows a score of 1–3 or 1–4 for each item, with lower numbers corresponding to increased severity of the risk factor. Each risk factor is added together to give the patients an overall score. This overall score is then compared with a standard reference value to allocate whether the patient has: severe risk ≤9, high risk with a score of 10–12, moderate risk 13–14 or mild risk 15–18 (Lindgren et al., 2002).

3.4.5 | Procedure

The data collection took place between May 2018–November 2018. Demographic data for staff nurses (year of birth, educational level, gender, working years at ward) and patients (ward specialty, year of birth, gender, main diagnoses) were collected. Two clinical nurse specialists (wound care and elderly care) acted as expert nurses. One expert nurse (LH) recruited the staff nurses and trained them and the other expert nurse on how to use PURPOSE T via an oral presentation and using case study vignettes (about 90 min). All staff nurses also performed one or two clinical assessments with patients using PURPOSE T before assessing included patients.

Two expert nurses purposively screened and included the patients. The expert nurses undertook a baseline assessment on each included patient, which incorporated the collection of demographic data, clinical assessment with the modified Norton Scale, the Braden Scale and PURPOSE T (convergent validity), and a staff nurse undertook a PURPOSE T assessment (inter-rater). To minimise the patient burden, the clinical skin assessment component of PURPOSE T assessment was undertaken at the same time by both assessors, but recorded separately (blinded). The expert nurse reassessed the patient, blinded to the baseline a second time using PURPOSE T (test–retest). The length of the test–retest interval, approximately 1–3 days for hospital patients and 2–7 days for nursing home patients, was planned to be short enough to ensure that there was no change in pressure ulcer risk.

3.5 | Ethical considerations

Approval to conduct the study was obtained from the Regional Ethical Review Board, Uppsala, Sweden (number 2018/196) prior to data collection. Patients and nurses received verbal and written information about the purpose of the study and the procedure for the data collection. Patients gave written consent. If patients could not answer, his/her legal representative was asked. All were assured that their participation was voluntary and that they could withdraw at any time without any explanation and that confidentiality would be ensured. The study followed The Declaration of Helsinki (WMA, 2013) as well as national and local ethical guidelines (CODEX, 2004).

3.6 | Data analysis

Cross-tabulations and kappa statistics were used to assess the inter-rater and test–retest reliability of the overall risk status ("at risk" [no pressure ulcer, but at risk and pressure ulcer category 1 or above or scarring]/"not at risk" [no pressure ulcer, not currently at risk]). To examine the extent of reliability and agreement for each individual PURPOSE T item, we used kappa statistics and percentages of agreement (Chen, Faris, Hemmelgarn, Walker, & Quan, 2009; Polit & Beck, 2016; Sim & Wright, 2005). We used published benchmarks to interpret estimates of the kappa statistics: poor $k < 0.20$, fair $0.21 \leq k \leq 0.40$, moderate $0.41 \leq k \leq 0.60$, good $0.61 \leq k \leq 0.80$ and very good $0.81 \leq k \leq 1.00$ (Chen et al., 2009; Sim & Wright, 2005). To examine the extent to which the modified Norton Scale, the Braden Scale and PURPOSE T assess the patients as "at risk" or "not at risk," and phi correlation coefficients were calculated with cross-tabulations (Chen et al., 2009; Polit &

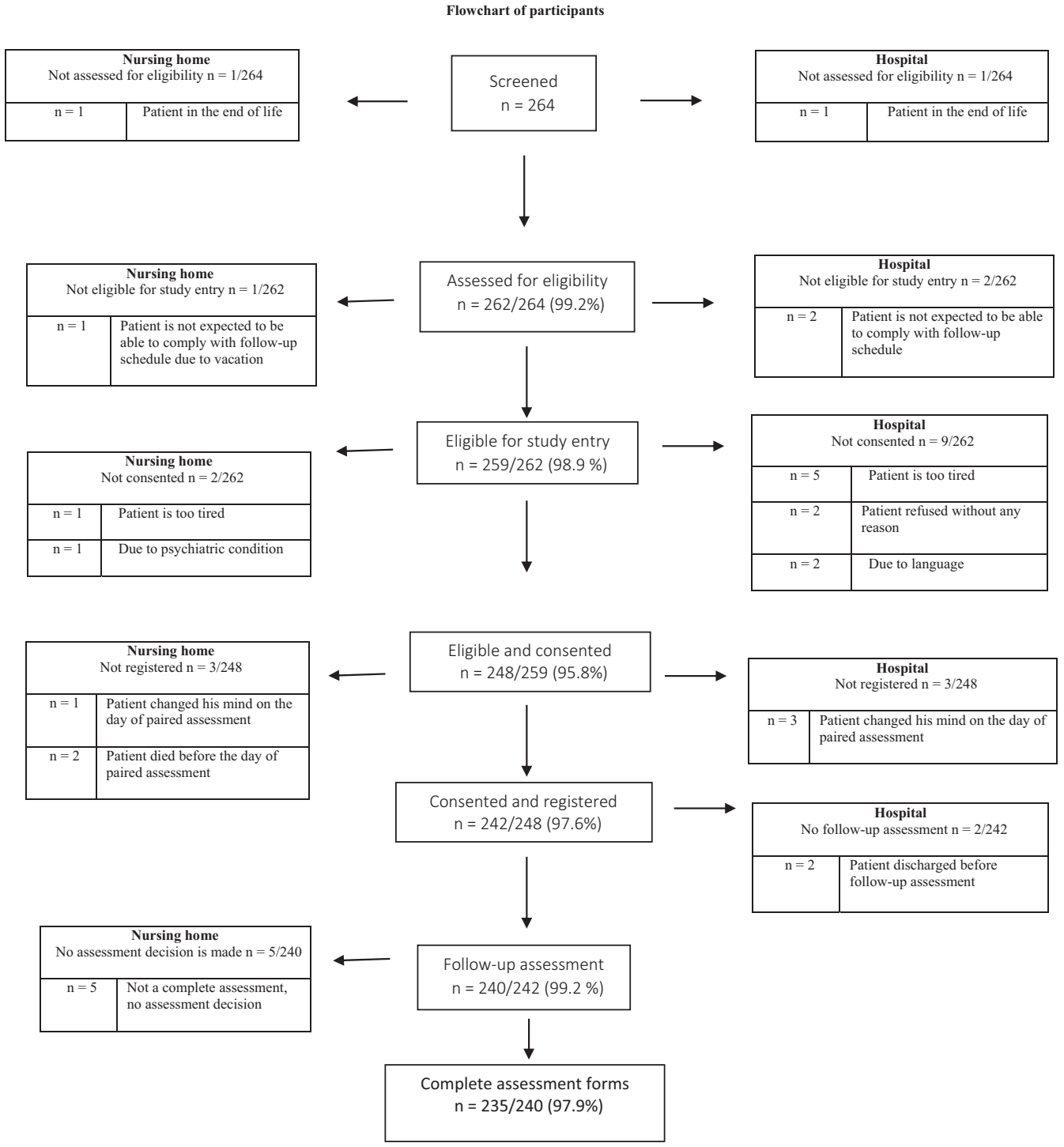

FIGURE 1 Flow of participants

Beck, 2016; Sim & Wright, 2005). All analyses were conducted using SPSS 25.0.

3.7 | Validity, reliability and rigour

PURPOSE T was translated from English into Swedish according to World Health Organization translation guidelines (WHO, 2010) and PURPOSE T language translation guideline (Coleman et al., 2018; WHO, 2010). An expert panel of two nurse researchers (LH and LG) translated the original instrument individually and then discussed their work together, analysing the different versions until reaching consensus. Thereafter, a native-born pressure ulcer expert (nurse with PhD) translated and interpreted the Swedish version back into English. Lastly, the authors of this paper verified the final Swedish version. This version was pretested on four nurses of the target population. No modifications were required.

4 | RESULTS

A total of 235 patients were registered for the study (Figure 1). The baseline demographic data of the patients are shown in Table 1. PURPOSE T identified 146 (62.1%) patients "at risk," the modified Norton Scale identified 59 (25.1%) patients "at risk," and the Braden Scale identified 78 (33.2%) patients "at risk" (Table 1).

Twenty-eight staff nurses participated in the study incorporating males ($n = 2$) and females ($n = 26$), mean (*SD*) age; 35 (9.3), years working as staff nurses; 7.8 (8.4) and years working at the ward/nursing home; 3 (2.7). All the included staff nurses had at least a 3-year bachelor's degree in nursing. Five of the staff nurses had a 1 year master's degree in caring sciences.

4.1 | Inter-rater reliability

There were 235 patients assessed by expert nurses and staff nurses to evaluate the inter-rater reliability. There was 90.2% (212/235) agreement in the three-way decision pathway between expert nurses and staff nurses (Table 2). The expert nurse and staff nurse performed the assessment with PURPOSE T in a similar manner, with a corresponding simple kappa statistic of 0.85 (0.79–0.91) and weighted kappa statistic of 0.88 (0.84–0.93), which indicated very good reliability (Table 2). When classified dichotomously as "at risk"/"not at risk," there was 95.5% (222/235) agreement between the expert nurse and staff nurse (Table 2).

Table 3 shows the levels of agreement between expert nurses and staff nurses for each risk factor item and varies from fair to

TABLE 1 Baseline demographic data

Variable	Nursing home $n = 115$		Hospital $n = 120$		Total $n = 235$
Age (years)					
Mean (*SD*)	85 (7.65)		74.9 (15.6)		79.9 (13.4)
Median (range)	85 (67, 102)		77.5 (20, 98)		82.0 (20, 102)
	n	%	*n*	%	
Sex					
Male	47	40.9	50	41.7	97 (41.3%)
Female	68	59.1	70	58.3	138 (58.7%)
Mobility status, PURPOSE T step 1, *n* (%)					
Walks independently with or without walking aids	58	50.4	44	36.7	102 (43.4%)
Needs help of another person to walk	17	14.8	36	30.0	53 (22.6%)
Spends all/majority of time in bed/chair	51	44.3	35	29.2	86 (36.6%)
Remains in same position for long period	52	45.2	55	45.8	107 (45.5%)
Step one screening, "fast track"	44	41.7	31	25.8	75 (31.9%)
The Braden Scale, *n* (%)					
At risk (≤18)	41	35.7	37	30.8	78 (33.2%)
Not at risk (>18)	73	63.5	82	68.3	157 (66.8%)
The modified Norton Scale, *n* (%)					
At risk (≤20)	28	24.3	31	25.8	59 (25.1%)
Not at risk (>20)	87	75.7	89	74.2	176 (74.9%)
PURPOSE T risk categorisation, *n* (%)					
Secondary prevention/treatment pathway	25	21.7	34	28.3	59 (25.1%)
Primary prevention pathway	42	36.5	45	37.5	87 (37.0%)
Not currently at risk pathway	48	41.7	41	34.2	89 (37.9%)
Pressure ulcer category 1	14	45.2	16	36.4	30 (40.0%)
Pressure ulcer category 2	6	19.4	16	36.4	22 (29.3%)
Pressure ulcer category 3	9	29.0	8	18.2	17 (22.7%)
Pressure ulcer category 4	1	3.2	1	2.2	2 (2.7%)
Pressure ulcer category unstageable	1	3.2	3	6.8	4 (5.3%)
Pressure ulcer total	31	41.3	44	58.7	75 (100.0%)

TABLE 2 Cross-tabulation of expert nurse PURPOSE T decision pathway at baseline by staff nurse decision pathway and expert nurse decision pathway at follow-up

Inter-rater *n* (%)				
Staff nurse				
Expert nurse baseline	**No pressure ulcer, not currently at risk**	**No pressure ulcer, but at risk**	**Pressure ulcer Category 1 or above or scarring**	**Total**
No pressure ulcer, not currently at risk	85 (36.2)	4 (1.7)	0 (0.0)	89 (37.9)
No pressure ulcer, but at risk	9 (3.8)	76 (32.3)	2 (0.9)	87 (37.0)
Pressure ulcer category 1 or above or scarring	0 (0.0)	8 (3.4)	51 (21.7)	59 (25.1)
Total	94 (40.0)	88 (37.4)	53 (22.6)	235 (100.0)
	Not at risk	**At risk**		**Total**
Not at risk	85 (36.2)	4 (1.7)		89 (37.9)
At risk	9 (3.8)	137 (58.3)		146 (62.1)
Total	94 (40.0)	141 (60.0)		235 (100.0)
Test–retest *n* (%)				
Expert nurse follow-up				
Expert nurse baseline	**No pressure ulcer, not currently at risk**	**No pressure ulcer, but at risk**	**Pressure ulcer Category 1 or above or scarring**	**Total**
No pressure ulcer, not currently at risk	87 (37.0)	2 (0.9)	0 (0.0)	89 (37.9)
No pressure ulcer, but at risk	4 (1.7)	83 (35.3)	0 (0.0)	87 (37.0)
Pressure ulcer category 1 or above or scarring	0 (0.0)	0 (0.0)	59 (25.1)	59 (25.1)
Total	91 (38.7)	85 (36.2)	59 (25.1)	235 (100.0)
	Not at risk	**At risk**		**Total**
Not at risk	87 (37.0)	2 (0.9)		89 (37.9)
At risk	4 (1.7)	142 (60.4)		146 (62.1)
Total	144 (61.3)	91 (38.7)		235 (100.0)

very good, according to the kappa value. In terms of agreement, the lowest level was 71.3% (112/157) for the analysis of sensory perception and the highest 98.5% (79/80) for the analysis of clinical judgement.

4.2 | Test–retest

There were 235 patients assessed by an expert nurse at both baseline and at follow-up to evaluate the test–retest reliability. There was 97.4% (229/235) agreement in the three-way decision pathway between the baseline and follow-up assessments (Table 2). The corresponding simple kappa statistic of 0.96 (0.93–0.99) and weighted kappa statistic of 0.97 (0.95–0.99) indicates very good reliability. When classified dichotomously as "at risk"/"not at risk," there was agreement between the baseline and the follow-up assessments for 97.4% (229/235) (Table 2).

Table 3 shows the levels of agreement between baseline and follow-up for each risk factor item and varies from good to very good according to the kappa value. In terms of agreement, the lowest level was 85.4% (135/158) for the analysis of sensory perception and the highest 98.5% (79/80) for the analysis of clinical evaluation.

4.3 | Convergent validity

The overall risk status of PURPOSE T was compared with the modified Norton Scale and the Braden Scale for all 235 patients at baseline. A moderate association was observed between PURPOSE T and the modified Norton Scale with a phi correlation of 0.41; also, a moderate association was observed between PURPOSE T and the Braden Scale with a phi correlation of 0.55, which indicates low to moderate correlation between the PU-RAI (Polit & Beck, 2016) (Table 4).

TABLE 3 Levels of agreement between expert nurses and staff nurses and between expert nurses at baseline and at follow-up for specific risk factor items

	Expert nurse vs. staff nurse			Expert nurse baseline vs. follow-up		
	n	%	kappa	*n*	%	kappa
Mobility (agreement on presence/absence of problem)	221/235	94.0	0.880	224/235	95.3	0.905
Skin status (agreement on presence/absence of problem)	96/99	97.0	0.900	93/99	93.9	0.787
Clinical judgement	79/80	98.5	0.902	79/80	98.5	0.902
Analysis of independent movement (agreement on presence/absence of problem)	138/157	87.9	0.684	149/158	94.3	0.853
Sensory perception	112/157	71.3	0.375	135/158	85.4	0.699
Nutrition (problem vs. no problem)	151/155	97.4	0.890	150/157	95.5	0.812
Diabetes status	153/157	97.5	0.915	153/158	96.8	0.896
Perfusions status (agreement on presence/absence of problem)	125/157	79.6	0.540	137/158	86.7	0.662
Moisture status (agreement on presence/absence of problem)	115/157	73.2	0.434	138/158	87.3	0.730
Medical devices	131/157	83.4	0.492	143/158	90.5	0.651
Pressure ulcer earlier	151/155	97.4	0.890	150/157	95.5	0.812

TABLE 4 Cross-tabulation of PURPOSE T with the modified Norton Scale and the Braden Scale overall risk status

The modified Norton Scale overall risk status *n* (%)				
PURPOSE T overall risk status	**Not at risk (>20)**	**At risk (≤20)**	**Total**	**Phi**
Not at risk	87 (37.0)	2 (0.9)	89 (37.9)	
At risk	89 (37.9)	57 (24.3)	146 (62.2)	
Total	176 (74.9)	59 (25.2)	235 (100)	
Measurement of Agreement PURPOSE T vs. The modified Norton Scale				0.41
The Braden Scale overall risk status *n* (%)				
PURPOSE T overall risk status	**Not at risk (>18)**	**At risk (≤18)**	**Total**	**Phi**
Not at risk	89 (37.9)	0 (0)	89 (37.9)	
At risk	68 (28.9)	78 (33.2)	146 (62.1)	
Total	157 (66.8)	78 (33.2)	235 (100.0)	
Measurement of Agreement PURPOSE T vs. the Braden Scale				0.55

5 | DISCUSSION

Expert and staff nurses assessed 235 patients in this replications study to assess the psychometric properties of PURPOSE T in the Swedish context.

Our results indicate good and very good inter-rater and test–retest reliability for the assessments decision overall, in keeping with Coleman et al. (2018). The agreement in the three-way decision pathway of the present study is also consistent with Coleman et al. (2018) demonstrating 81.7% inter-rater and over 92.0% test–retest. The agreement of "at risk"/"not at risk" for both inter-rater and test–retest was also high in both studies, at least 93.4%. In the UK, the levels of agreement for each risk factor are also high, but perfusion demonstrates a lower result, 72.8% (Coleman et al., 2018), and the staff nurses are not used to assessing perfusion as Waterlow does not include perfusion (Nixon & McGough, 2001). The low numbers of agreement of those risk factors could indicate that the staff nurses need more practice and education in using PURPOSE T.

As predicted, PURPOSE T demonstrated a moderate phi value for convergent validity, when compared with the modified Norton Scale and the Braden Scale providing evidence of logical relationship among items, domains and concepts that should exist with measures of related concepts (Research C, 2020). A high phi value would indicate that PURPOSE T was very similar; thus, it would be unclear why an additional instrument was needed. A low correlation would suggest differences in the concepts being measured

and raise concern about content validity and which instrument could most accurately measure pressure ulcer risk. The correlation between PURPOSE T and the Braden Scale and Waterlow found by Coleman et al. (2018) also demonstrated a moderate phi value.

An important feature of PURPOSE T is that it includes a skin inspection, which is not included in the modified Norton Scale or the Braden Scale (Lindgren et al., 2002; National Pressure Ulcer Advisory Panel, 2019). Skin inspection allows nurses to make a distinction between patients that are at risk of developing pressure ulcers and require preventative interventions and those who already have an existing pressure ulcer and require enhanced interventions and treatment (Coleman, Nelson, et al., 2014). In our study, PURPOSE T identified 59 patients with a pressure ulcer or a scar from a previous pressure ulcer and 87 patients "at risk." However, while the modified Norton Scale identified 59 patients "at risk" and the Braden Scale identified 78 patients "at risk," these instruments do not make the distinction between those with and without pressure ulcers, which could prevent nurses from acting on this information.

The risk factor items of mobility and nutrition in PURPOSE T demonstrated high levels of agreement (94.0%–97.5%), while sensory perception, perfusion, moisture and medical devices demonstrated lower levels of agreement (between 71.3%–83.4%) in the Swedish context. This result could indicate that the staff nurses are not used to assessing sensory perception, perfusion and medical devices as these risk factors are not included in the modified Norton Scale which they are more familiar with (Lindgren et al., 2002). Moisture is included in both PURPOSE T and the modified Norton Scale but has different descriptors: PURPOSE T includes exudate, urine, faeces and wound liquids and the modified Norton Scale only urine and faeces. The staff nurses could be insecure and assess moisture in PURPOSE T as in the modified Norton Scale; therefore, a low agreement is demonstrated.

PURPOSE T, step one screening, is a "fast track" for those patients who are clearly not at risk and was used for 75 (32.0%) patients included in the present study. When using the modified Norton Scale and the Braden Scale, the nurse is required to undertake the whole assessment on all patients (Lindgren et al., 2002). In Sweden, the nursing workload is high; therefore, it is important that care is appropriately focused on necessary activities, and the "fast track" step 1 of PURPOSE T facilitates this (Coleman et al., 2018; Gunningberg et al., 2019). If the patient's status changes, the nurse should reassess the patient's risk for pressure ulcer (National Pressure Ulcer Advisory Panel, 2019). We know that 91% of the hospital-acquired pressure ulcers are preventable (Gunningberg et al., 2019), and implementation of PURPOSE T could enable a valid risk assessment.

5.1 | Strengths and limitations

The major strength in this study was that we replicated the method by Coleman et al. (2018). Thus, we can compare the results of both studies in two international contexts. Both studies compared diverse reliability and validity aspects, which are important properties for evaluating psychometric properties (Polit & Beck, 2016). Using both hospital and nursing homes and the four broad risk levels of patients gave a variation in age and mobility; therefore, the staff nurse was able to use PURPOSE T in different clinical situations. The study was adapted for the Swedish context using expert nurses to include patients compared to Coleman et al. (2018) who used staff nurses to include patients. However, we included approximately the same number of patients in each risk level group.

6 | CONCLUSION

The results of this study indicate that the Swedish version of PURPOSE T showed good inter-rater and test–retest reliability to assess patients' risk and pressure ulcer status and a moderate association for convergent validity when compared with other PU-RAIs. Further research should be undertaken, and the next step will be to evaluate the nurses' experience of using PURPOSE T in order to facilitate future implementation.

7 | RELEVANCE TO CLINICAL PRACTICE

It is important to use an evidence-based and validated PU-RAI. Our findings show that PURPOSE T identifies more patients at risk and with pressure ulcers compared to traditional PU-RAIs in Sweden. Because PURPOSE T shows a risk profile of the patient rather than a numeric score, the nurses have to reflect on the nursing care planning. We need to consider the amount of education and training that is needed for nurses. To implement PURPOSE T successfully, a prerequisite is that the instrument should be digitalised in the electronic health record. Thus, leadership at different levels need to be involved.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHOR CONTRIBUTION

All authors have agreed on the final version of the paper and have made substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, drafting the article or revising it critically for important intellectual content.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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