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Abstract

Effectiveness of the Braden risk screening tool for pressure injuries

Citation Garrubba M & Melder A. 2017. Effectiveness of the Braden risk screening tool for pressure injuries: Systematic Review. Centre for Clinical Effectiveness, Monash Innovation and Quality, Monash Health, Melbourne, Australia.

Background

The Executive Director Residential and Support Services/Chief Nursing and Midwifery Officer requested that the Centre for Clinical Effectiveness undertake a review of the literature to identify evidence around the effectiveness of the Braden risk screening tool for predicting risk of developing pressure injuries in acute care environments. For the purpose of this review pressure ulcers and pressure injuries are used interchangeably.

Question

Is the Braden risk screening tool the most appropriate tool to screen for risk of developing pressure injuries in an acute care environment and are there any particular factors missed by using it?

Methods

A systematic search of papers in English from 2012 to present was undertaken in Medline, CINAHL and the internet. Search terms are outlined in Appendix 1 and include variations of pressure ulcers/injuries and risk assessment/tools. Only evidence-based clinical practice guidelines, systematic reviews and RCTs were eligible for inclusion. Papers were screened for inclusion and appraised by one reviewer in consultation with colleagues, using inclusion and exclusion criteria established *a priori*. A narrative synthesis of the results of included papers was conducted.

Results

Four systematic reviews [1-4] and four evidence-based clinical practice guidelines [5-8] were included. The systematic reviews varied from moderate [2, 4] to high quality [1, 3]. The quality of the studies included in the systematic reviews was variable, ranging from low risk of bias to high risk of bias. The included guidelines ranged from high quality [8] to moderate quality [5-7].

Validity of pressure injury risk assessment tools

Three systematic reviews [1, 2, 4] assessed the validity of the Braden scale for risk assessment of pressure injuries. When compared to each other [1], all assessment tools (Braden, Norton and Waterlow) were found to show a similar predictability regarding pressure ulcer development in older adults. Despite indicating similarity of validity across the tools, there was high variability between included studies (eg sample size, study design, care setting, reference standards), limiting the interpretation of this finding [1, 2]. The Braden scale was found to be the most extensively validated tool with a meta-analysis of studies confirming a good predictive capacity [4].

Usefulness of pressure injury risk assessment tools in predicting development of pressure injuries

There is currently no RCT evidence to suggest that undertaking structured pressure ulcer risk assessment reduces the incidence of pressure ulcers [3].

Best Practice as outlined by evidence-based clinical practice guidelines

Under chapters of risk assessment in the four identified guidelines, best practice was reported as performing patient risk assessment upon entry to the healthcare setting [5-7], using a validated tool [5-8], and considering additional risk factors such as perfusion and oxygenation, increased body temperature, advanced age [5], poor nutritional status, increased skin moisture, mobility, sensory perception, hematological measures and general health status [7].

Conclusion

In conclusion, evidence from clinical guidelines and systematic reviews of moderate to high quality suggest that the Braden scale is a validated and reliable tool to assess patients risk of developing a pressure injury in acute care environments and suggest that validated tools be used in conjunction with clinical judgement and consideration of additional risk factors not covered by risk assessment tools but likely to affect a patients risk including age, mobility and general health status.

Full Review

Background

The Executive Director Residential and Support Services/Chief Nursing and Midwifery Officer requested that the Centre for Clinical Effectiveness undertake a review of the literature to identify evidence around the effectiveness of the Braden risk screening tool for predicting risk of developing pressure injuries in acute care environments.

Question

Is the Braden risk screening tool the most appropriate tool to screen for risk of developing pressure injuries in an acute care environment and are there any particular factors missed by using it?

Search strategy

Inclusion/Exclusion Criteria

Table 1. Inclusion/exclusion criteria

Setting	Include: Acute Care Hospital environments Exclude: All other settings
Population	Adult patients only
Intervention	Include: Braden risk screening tool for pressure injury
Comparator	Include: Any other risk screening tool for pressure injury
Outcomes	• Validity of the Braden risk screening tool for pressure injuries in the acute environment • Does the Braden risk screening tool miss any factors important for assessing pressure injuries
Publication details	Include: Systematic Reviews, Meta-Analysis, randomised controlled trials (RCTs), Evidence-Based Clinical Guidelines Exclude: All other study designs, editorials, opinion papers, conference abstracts
Limitations	2014-2017; English, Humans
Databases	Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R); CINAHL Plus; Google

Search terms are presented in Appendix 1.

Study Selection

Titles and abstracts identified were exported to EndNote X7 (Thompson, Reuters, Carlsbad, California, USA). Papers identified were screened using inclusion and exclusion criteria established *a priori.* Searches of Medline, CINAHL and the internet were screened by one reviewer in consultation with colleagues as necessary. Literature was included based on the above criteria.

Quality Appraisal

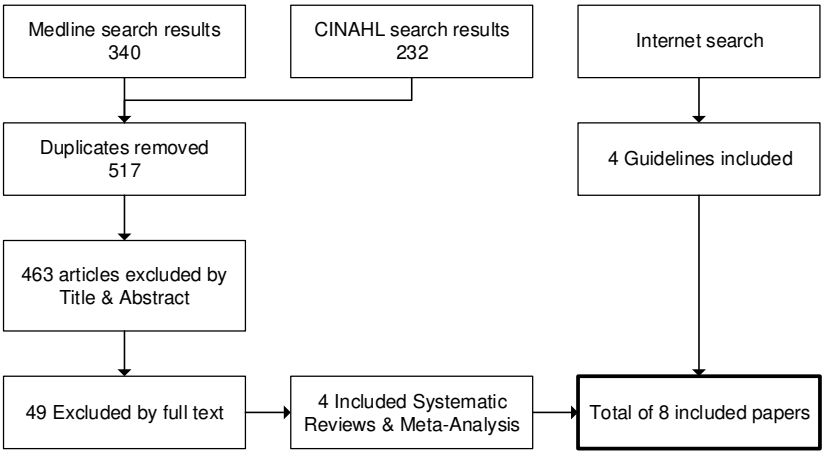
Included Systematic Reviews and Meta-Analysis were appraised using standardised quality appraisal checklists [9]. Guidelines were appraised using the International Centre for Allied Health Evidence (iCAHE) Guideline Quality Checklist [10].

Results

Study selection

This diagram indicates the flow of identified and included articles from the different sources searched.

The search of Ovid Medline and CINAHL identified a total of 517 results after removing duplicates. One reviewer (MG) applied inclusion criteria and 4 systematic reviews [1-4] were included. A search of the internet identified 4 clinical practice guidelines [5-8].



Characteristics of included studies

Aims

Three of the identified systematic reviews were aimed at confirming the predictive validity of risk assessment tools for older adults (aged 60 years plus) [1], adults ranging in age from 40-60 years [2], and one that did not specify the age of participants in included studies [4]. One review focused on whether using pressure ulcer risk assessment tools reduced the incidence of pressure ulcers [3].

All guidelines were aimed at the prevention, treatment and management of pressure ulcers. However for this review we have only focused on recommendations related to risk assessment.

Settings

The settings of included studies in the systematic reviews primarily included acute care hospital admission units [1-4]. Other study settings included ICUs [1, 2], surgical ICUs [2], oncology wards [3], trauma settings [2], long term or home care settings [1].

Tools

All systematic reviews included the Braden Scale for risk assessment for pressure ulcers as part of their analyses [2, 4].

Outcomes

Included reviews assessed the following outcomes: predictive validity by tools [1, 4]; predictive validity of tools by average age group, location of hospitalisation, reference standards [2]; and the proportion of participants developing new pressure ulcers of any grade (for the purpose of this review a pressure ulcer was defined as a localised injury to the skin, underlying tissue or both, usually over a bony prominence, as a result of pressure, or pressure in combination with shear) [3].

Quality assessment of included reviews and guidelines

Two systematic reviews were assessed as high quality [1, 3] and two were assessed as moderate quality [2, 4]. From the information provided allocation and blinding [1, 2, 4], author conflicts of interest [4] and strengths, limitations and validity of included studies [2] were not well reported.

Quality of the studies included in the systematic reviews was variable. One review included 29 prospective and retrospective studies [1] and another included 73 controlled clinical trials and prospective cohort studies [4] however neither reported on the quality of included studies, one review included 21 prospective studies and reported these all to be of high quality using the Quality Assessment of Diagnostic Accuracy Studies-II tool [2], one review included 2 randomised controlled trials, one was considered to have a high risk of bias the other a low risk of bias [3].

The four evidence-based clinical practice guidelines [7-10] were assessed as moderate to high quality using the iCAHE quality checklist. Points were deducted from a possible score of 14; reason for reduced scores are listed below. The strength of included recommendations varied across the four guidelines from consensus recommendations to moderate to very low level evidence.

Guideline	Quality score	
The Wound Ostomy and Continence Nurses Society Guideline[5]	10/14	• Guideline not being readily available in full text • No review date documented • No links between the hierarchy and quality of evidence to recommendations
Agency for Clinical Innovation guideline[6]	11/14	• No dates provided for when literature was searched • No search strategy to identify underlying evidence
National Pressure Ulcer Advisory Panel [7]	10.5/14	• No review date documented • No dates provided for when literature was searched • No search strategy to identify underlying evidence
National Institute for Health and Care Excellence [8]	14/14	

Explanation of statistics used to determine validity and accuracy of risk assessment tools

To assess the accuracy and validity of the risk assessment tools included in the systematic reviews, meta-analysis of included studies was undertaken where appropriate using sensitivity, specificity, relative risk or risk ratios and area under the ROC (receiver operating characteristic) statistics.

The sensitivity calculation reflects how good the risk assessment tool is at predicting who will develop a pressure ulcer while the specificity calculation reflects how good the tool is at predicting who will not develop a pressure ulcer.

Relative risk or risk ratios are the ratio of the probability of an event occurring (for example, developing a pressure ulcer) in an exposed group (patients with risk) to the probability of the event occurring in a comparison, non-exposed group (patients without risk).

The area under the ROC is another measure of accuracy where an area of 1 represents a perfect test; an area of 0.5 represents a worthless test. A rough guide for classifying the accuracy of a diagnostic test is the traditional academic point system: 0.90-1 = excellent, 0.80-0.90 = good, 0.70-0.80 = fair, 0.60-0.70 = poor and 0.50-0.60 = fail.

Results of individual studies

The results of the individual systematic reviews are included in Table 1. A summary of all relevant recommendations from identified guidelines is included in Table 2.

Synthesis of results

Validity of pressure injury risk assessment tools

Park et al (2016) assessed the validity of three risk assessment tools (Braden, Norton and Waterlow scales). Predictive validities in the three scales yielded 0.76 in sensitivity of the Norton Scale followed by 0.72 and 0.53 in the Braden and the Waterlow Scales, respectively [1]. Specificity levels were 0.55, 0.63, and 0.84 in Norton, Braden, and Waterlow in that order. Because the Waterlow Scale reflects lower sensitivity and higher specificity than the Braden and Norton Scales, the Scale is inappropriate to screen for risks of pressure ulcers in older adults [1]. While the values of sensitivity and specificity from the current studies indicated moderate accuracy of all three tests as well as the AUC of sROC between 0.7 and 0.9, the test results of heterogeneity (any kind of variability of among studies) indicated more than 80% of variability in the sensitivity of three tools, which are attributable to between-study variation. Therefore, the interpretation of the findings is limited with regard to conclusion [1].

Park et al (2015) assessed the validity of the Braden scale and found that the area under the ROC to be 0.7, which was analyzed to have a moderate predictive validity. Sensitivity of the Braden scale was seen to decrease as the average patient age increased. The findings conclude that screening tools have a limitation to predict the accuracy in assessing pressure ulcer risks in adults, because high heterogeneity existed between studies [2].

Garcia-Fernandez et al (2014) assessed the ability of pressure ulcer risk assessment tools along with clinical judgment of nurses to predict pressure ulcer risk. They found the Braden scale to be the most extensively validated tool with a meta-analysis of studies confirming a good predictive capacity. In terms of comparing clinical judgement of nurses with the

Braden, Norton and Waterlow scales a meta-analysis revealed poor predictive capacity of clinical judgement however findings were not conclusive [4].

Usefulness of pressure injury risk assessment tools in predicting development of pressure injuries

Moore et al (2014) assessed whether using a structured, systematic pressure ulcer risk assessment tool, in any healthcare setting reduces the incidence of pressure ulcers. The review found no RCT evidence to suggest that undertaking structured pressure ulcer risk assessment reduces the incidence of pressure ulcers [3].

Best Practice as outlined by evidence-based clinical practice guidelines

Under chapters of risk assessment in the four identified guidelines, best practice was noted in performing a risk assessment upon entry to the healthcare setting, in a structured format, in conjunction with a comprehensive visual assessment to determine the patients risk [5-7]. Using a validated tool to undertake the risk assessment was also recommended as best practice where the Braden scale is recommended as a valid and reliable tool for assessing pressure injury risk in critically ill adults and it is recommended that staff select a tool that is valid and reliable to the population and setting [5-8]. Finally, if using a validated tool to assess risk of pressure injuries in patients, assessing additional risk factors is important [5, 7]. These risk factors include perfusion and oxygenation, increased body temperature, advanced age [5], poor nutritional status, increased skin moisture, mobility, sensory perception, hematological measures and general health status [7].

Conclusion

In conclusion, evidence from clinical guidelines and systematic reviews of moderate to high quality suggest that the Braden scale is a validated and reliable tool to assess patients risk of developing a pressure injury in acute care environments and suggest that validated tools be used in conjunction with clinical judgement and consideration of additional risk factors not covered by risk assessment tools but likely to affect a patients risk including age, mobility and general health status.

Fundamentally, risk assessment alone will make no difference unless it is followed up by an intervention to combat risk, and these interventions need to be available [3].

Table 1: Summary of included systematic reviews and meta-analysis

Ref	Quality	Aim	# of studies included	Population/Setting	Risk Assessment Tools	Outcomes reported	Results
[1]	High	To screen the pressure ulcer risk by evaluating a predictive function of tools among older adults by use of a meta-analysis methodology. Specifically: • examining characteristics of studies which applied assessment tools for risk of pressure ulcers and their outcomes of prevalence of pressure ulcers in older adults through a systematic review; • summarizing the evidence of overall predictive validities and heterogeneity from selected studies by type of screening tools; and • exploring heterogeneity among the studies by the subgroups of participants (age and gender), care facilities conducting the studies (acute hospital and long-term care), and reference standards.	29 (prospective and retrospective study design)	8 studies had only adults aged 60+ 21 studies had mixed age group with an average age of 60+ years Acute hospital and long term facilities	Braden Scale, Norton Scale, Waterlow Scale	Accuracy of overall predictive validities of included tools	Predictive validity by type of tools assessing risk of pressure ulcers (Braden, Norton and Waterlow) **Braden Scale** • 25 studies used Braden Scale (N = 10,547). The overall pooled sensitivity and specificity were 0.72, 95% CI [0.69, 0.74] and 0.63, 95% CI [0.62, 0.64], respectively, which reflected a moderate level of predictive validities • Positive LR and negative LR were 2.31, 95% CI [1.98, 2.69] and 0.43, 95% CI [0.36, 0.51], respectively, which yielded a diagnostic OR of 6.50, 95% CI [4.64, 9.11]. • The test accuracy value of AUC in sROC was 0.79 (SE = 0.02), and index value of Q* of 0.72 (SE = 0.02). • Overall I^2 values in sensitivity and specificity yielded 79.9% ($\chi 2$ = 119.57, p < .001) and 96.4% ($\chi 2$ = 673.34, p <.001), respectively, which indicated the existence of heterogeneity (inconsistency) among the studies. **Norton Scale** • In the five research studies (N = 2,408) which applied the Norton Scale, the pooled sensitivity and specificity were 0.76, 95% CI [0.71, 0.80] and 0.55, 95% CI [0.53, 0.57], respectively. • The diagnostic OR, 6.41, 95% CI [1.72, 23.88] and AUC area of sROC were 0.84 (SE = 0.07). **Waterlow Scale** • Studies using the Waterlow Scale were found in five research studies (N =1,406). The pooled sensitivity was 0.53, 95% CI [0.47, 0.60] and pooled specificity, 0.84, 95% CI [0.81, 0.86]. • The diagnostic OR, 9.06, 95% CI [6.30, 13.04]; and AUC of sROC, 0.81 (SE = 0.03). **Overall heterogeneity between studies** Regarding heterogeneity indexes, the I2 values in sensitivity and specificity of all three scales ranged approximately from 79.9% to 90.5% and 96.4% to 98.7%, respectively, which indicated moderate to high heterogeneity across research studies.
[2]	Moderate	To confirm the predictive validity of the Braden Scale, by conducting a meta-analysis based on prospective diagnostic assessment research in order to confirm its ability to determine the	21 (prospective study design)	Patients who had not developed pressure ulcers at the time of hospitalisation. Average age varied from 40-60 years	Braden Scale	Evaluation of the predictive validity of the Braden Scale. Detailed meta-analysis by average age group, location of hospitalisation	The meta-analysis of the Braden Scale in a total of 21 selected studies revealed that: • The pooled sensitivity was 0.72 (95% CI 0.68, 0.75), and the heterogeneity among the studies was found to be moderate at 64.0% (X2 ¼ 55.48, p < .001). • The pooled specificity was 0.81 (95% CI 0.80, 0.82) while the heterogeneity

Ref	Quality	Aim	# of studies included	Population/Setting	Risk Assessment Tools	Outcomes reported	Results
		occurrence of pressure ulcers.		old and in 4 studies the average age was unclear.		(inpatient wards and ICU), reference standards (evaluation standards of skin conditions for defining pressure ulcers and stages of pressure ulcers.	among studies was found to be high at 96.2% (X2 ¼ 525.38, p < .001). • The pooled positive likelihood was 3.44 (95% CI 2.66, 4.44) and the pooled negative likelihood was 0.37 (95% CI 0.30, 0.48). • The pooled diagnostic odds ratio was 10.30 (95% CI 6.65, 15.95); the sROC AUC was 0.84 (SE ¼ 0.02) Detailed analysis by Age: • The pooled sensitivity of six studies, which reported the average **age group as in the 50s**, was 0.88 (95% CI 0.81, 0.93), and no heterogeneity among the studies was found at 0.0% (X2 ¼ 3.00, p ¼ .70). The pooled specificity was 0.88 (95% CI 0.87, 0.89), and the heterogeneity among the studies was high at 97.8% (X2 ¼ 230.99, p < .001). The sROC AUC was 0.92 (SE ¼ 0.02). • In five studies, in which the average **age group was in the 60s**, the pooled sensitivity was 0.68 (95% CI 0.62, 0.73), and the pooled specificity was 0.68 (95% CI 0.65, 0.71). The heterogeneities among the studies were 0.0% (X2 ¼ 1.85, p ¼ .76) and 73.8% (X2 ¼ 15.24, p ¼ .004), respectively, and the sROC AUC was 0.73 (SE ¼ 0.04). • The pooled sensitivity of three studies in which the **average age group was in the 70s** was 0.48 (95% CI 0.34, 0.62) (Fig. 3-E), and the pooled specificity was 0.69 (95% CI 0.63, 0.74) (Fig. 3-F). The heterogeneities among the studies were high at 49.1% (X2 ¼ 3.93, p ¼ .14), and 89.0% (X2 ¼ 18.16, p < .001), respectively. The sROC AUC was 0.62 (SE ¼ 0.15). • Indicates that the pooled sensitivity decreases as the age increases and the same pattern seen for specificity Detailed analysis by location of hospitalisation: • In six studies, which targeted inpatients in the inpatient ward, the pooled sensitivity was 0.72 (95% CI 0.63, 0.80) while the pooled specificity was 0.76 (95% CI 0.73, 0.79) (Fig. 3-H). The heterogeneities among the studies were 64.0% (X2 ¼ 13.90, p ¼ .02) and 92.1% (X2 ¼ 63.55, p < .001), respectively. The sROC AUC was 0.86 (SE ¼ 0.05). In five studies that targeted inpatients in the intensive care unit, the pooled sensitivity was 0.82 (95% CI 0.74, 0.88) (Fig. 3-I); the pooled specificity was 0.72 (95% CI 0.67, 0.77), and the heterogeneities among the studies were moderate at 58.7% (X2 ¼ 9.69, p ¼ .05) and 56.4% (X2 ¼ 9.18, p ¼ .06), respectively. The sROC AUC was 0.82 (SE ¼ 0.03). • Braden seen to have a higher diagnostic accuracy in ICU than in inpatient wards however not found to be statistically significant.
[3]	High	To determine whether using structured, systematic pressure ulcer risk assessment tools, in any health care setting, reduces the incidence of	2 (RCTs)	People without pressure ulcers, of any age, in any healthcare setting (primary, secondary	Any pressure ulcer risk assessment tool	The proportion of participants developing new pressure ulcers of any grade (for the	*Braden pressure ulcer risk assessment and training Vs unstructured pressure ulcer risk assessment following the same training.* • This study randomly allocated nine wards into three groups; groups A, B and C. The randomisation resulted in unequal allocation across the groups

Ref	Quality	Aim	# of studies included	Population/Setting	Risk Assessment Tools	Outcomes reported	Results
		pressure ulcers.		and extended care).		purpose of this review a pressure ulcer was defined as a localised injury to the skin, underlying tissue or both, usually over a bony prominence, as a result of pressure, or pressure in combination with shear)	and no explanation for this was given in the study report. • Following delivery of the training to the staff, Saleh 2009 enrolled 150 patients with a Braden score of ≤18, from six wards. Seventy-four patients were in the Braden scale group (Group A), and 76 patients were in the training group (Group B). The ward, not the patient, was the unit of randomisation and therefore this would be a cluster RCT study design, however, it is unclear from the trial report if the analysis of data accounted for the clustering. The authors did not describe the characteristics of the participants in terms of age, gender or underlying health status specifically for each group. • The patients were followed up for a period of eight weeks. • Sixteen pressure ulcers developed in the Braden scale group and 17 pressure ulcers developed in the training group. There was no statistically significant difference in pressure ulcer risk between the groups (RR 0.97, 95% CI 0.53 to 1.77) *Braden pressure ulcer risk assessment and training Vs unstructured pressure ulcer risk assessment alone* • Following delivery of the training to the staff, Saleh 2009 enrolled 106 patients from three wards with a Braden score of ≤ 18. These 106 patients were managed using unaided clinical judgement (Group C). • The incidence of pressure ulcers in this clinical judgement group was compared with the 74 patients who were in the Braden scale group (Group A). The ward, not the patient, was the unit of randomisation, however, it is unclear from the trial report if the analysis of data accounted for the clustering. The authors did not describe the characteristics of the participants, in terms of age, gender or underlying health status, specifically for each group. The patients were followed up for a period of eight weeks. • Sixteen pressure ulcers developed in the Braden scale group and 16 pressure ulcers also developed in the clinical judgement group. There was no statistically significant difference between the groups in terms of pressure ulcer risk (RR 1.43, 95% CI 0.77 to 2.68)
[4]	Moderate	To establish the usefulness of pressure ulcer risk assessment tools and nurses clinical judgment in the prediction of pressure ulcer development.	73 (controlled clinical trials and prospective cohort studies)	Patients had no pressure ulcers at baseline	Any risk assessment tool for pressure ulcers Compared to each other and to clinical judgment	Ability of pressure ulcer risk assessment scale along with clinical judgement of nurses to predict pressure ulcer risk.	The Braden Scale was evaluated in 33 studies, making it the most extensively validated PURAS. The meta-analysis of these studies revealed a good predictive capacity (RR = 4.26; 95% CI: 3.27-5.55), which was confirmed by sensitivity analysis after elimination of 2 outlying studies. We found 4 studies that compared the clinical judgment of nurses with different PURAS. (Braden, Norton, and Waterlow). Meta-analysis revealed poor predictive capacity of clinical judgment (RR = 1.95; 95% CI: 0.94-4.04); however, findings are not conclusive because the CI includes unity. As a result, it is not possible to determine whether PU incidence in patients considered at risk by clinical judgment is higher or lower than that in patients who remained ulcer free. The RR is the ratio of the probability of the event (PU) occurring in the exposed

Ref	Quality	Aim	# of studies included	Population/Setting	Risk Assessment Tools	Outcomes reported	Results
							group (patients with risk) versus a non-exposed group (patients without risk). An RR = 1 means that there is no difference in PU incidence between the 2 groups, and an RR > 1 means that the incidence is higher than that in exposed patients. One advantage of the RR is that it yields narrow confidence intervals in comparison to sensitivity and specificity values and odds ratios. The Braden Scale has undergone the most complete validation process in terms of the number of studies and variety of care settings. Its predictive capacity is high, with a score below the cutoff point implying that the patient has a 3.2- to 5.5-fold higher risk of PU onset. These results are in agreement with recent reports that this scale has the highest predictive power. ***Clinical Judgment*** Various authors have questioned the need for risk scales, claiming that nurses' clinical judgment offers an equivalent predictive capacity. However, this assertion is not supported by finding from our meta-analysis that incorporated 4 studies with a pooled sample of 1500 patients. Our analysis indicates that clinical judgment alone cannot be considered a good estimator of PU risk. This conclusion is also consistent with 2 systematic reviews with meta-analyses. A possible explanation for the wide confidence interval may be the varied knowledge and clinical experience of the nurses participating in the studies. Thus, the clinical judgment of nurses with experience in the detection and management of PUs may be highly accurate, whereas that of less experienced nurses might be less so. Indeed, the reason for using scales is to provide a structured support for risk assessment and avoid inter-examiner variability. ***Recommendations for Clinical Practice*** Based on the results of this systematic review, we recommend that health care providers incorporate a validated and reliable PURAS in their PU prevention programs. Clinical judgment should be complementary or used in a 2-step detection (screening) strategy for the individual evaluation of patients already identified as at risk of PU based on results of instrument-driven initial assessment.

Table 2: Summary of relevant recommendations from included evidence-based clinical practice guidelines

Best Practice Areas	Summary of Recommendations	Ref
Perform a risk assessment	Perform a risk assessment upon the patient's entry to a healthcare setting, and repeat the assessment on a regularly scheduled basis, or when there is a significant change in the individual's condition. Level of Evidence = C (Benefit/Effectiveness/Harm = Class I)	[5]
	Use a pressure injury risk assessment scale in conjunction with a comprehensive visual assessment to determine the patient's risk of pressure injury and to inform the development of a prevention plan. (Consensus)	[6]
	Use a structured approach to risk assessment that is refined through the use of clinical judgment and informed by knowledge of relevant risk factors. (Strength of Evidence = C; Strength of Recommendation = 👍👍)	[7]
Using a validated tool	Use a valid/reliable risk assessment tool in conjunction with the identification of additional risk factors (eg, perfusion and oxygenation, increased body temperature, and advanced age), along with clinical judgment. Level of Evidence = C (Benefit/Effectiveness/Harm = Class I)	[5]
	The Braden Scale for Predicting Pressure Sore Risk is the recommended validated and reliable tool for assessing pressure injury risk in critically ill adults (B).	[6]
	If risk assessment tools are selected as a structured approach for risk assessment, additional factors (e.g., perfusion, skin status and other relevant risks) should be considered as part of a comprehensive risk assessment. Regardless of how the risk assessment is structured, clinical judgment is essential.	[7]
	When using a risk assessment tool, select a tool that is appropriate to the population, is valid and is reliable. (Strength of Evidence = C; Strength of Recommendation = 👍)	[7]
	Consider using a validated scale to support clinical judgement (for example, the Braden scale, the Waterlow score or the Norton risk-assessment scale) when assessing pressure ulcer risk. (Very Low Quality Evidence)	[8]
Assess for additional risk factors	Assess for intrinsic/extrinsic risk factors. Risk factors can be defined as anything that increases the chance of developing a pressure ulcer. Level of Evidence = C (Benefit/ Effectiveness/Harm = Class I)	[5]
	Use a structured approach to risk assessment that includes assessment of activity/mobility and skin status. (Strength of Evidence = B; Strength of Recommendation = 👍👍) Consider bedfast and/or chairfast individuals to be at risk of pressure ulcer development. (Strength of Evidence = B; Strength of Recommendation = 👍) Consider the impact of mobility limitations on pressure ulcer risk. (Strength of Evidence = B; Strength of Recommendation = 👍👍)	[7]
	Consider the impact of the following factors on an individual's risk of pressure ulcer development: • perfusion and oxygenation; • poor nutritional status; and • increased skin moisture. (Strength of Evidence = C; Strength of Recommendation = 👍)	[7]
	Consider the potential impact of the following factors on an individual's risk of pressure ulcer development: • increased body temperature; • advanced age; • sensory perception; • hematological measures and; • general health status (Strength of Evidence = C; Strength of Recommendation = 👍)	[7]
	Recognize additional risk factors and use clinical judgment when using a risk assessment tool. (Strength of Evidence = C; Strength of Recommendation = 👍👍) *Caution: Do not rely on the results of a risk assessment tool alone when assessing an individual's pressure ulcer risk.*	[7]

References

1. Park, S.H., Y.S. Lee, and Y.M. Kwon, *Predictive Validity of Pressure Ulcer Risk Assessment Tools for Elderly: A Meta-Analysis.* Western Journal of Nursing Research, 2016. **38**(4): p. 459-83.
2. Park, S.H., Y.K. Choi, and C.B. Kang, *Predictive validity of the Braden Scale for pressure ulcer risk in hospitalized patients.* Journal of Tissue Viability, 2015. **24**(3): p. 102-13.
3. Moore, Z.E.H. and S. Cowman, *Risk assessment tools for the prevention of pressure ulcers.* Cochrane Database of Systematic Reviews, 2014(2): p. N.PAG-N.PAG.
4. Garcia-Fernandez, F.P., P.L. Pancorbo-Hidalgo, and J.J. Agreda, *Predictive capacity of risk assessment scales and clinical judgment for pressure ulcers: a meta-analysis.* Journal of Wound, Ostomy, & Continence Nursing, 2014. **41**(1): p. 24-34.
5. Wound Ostomy and Continence Nurses Society (WOCN), *Guideline for prevention and management of pressure ulcers (injuries).* Mt. Laurel (NJ), 2016. **Wound Ostomy and Continence Nurses Society (WOCN)**(164p).
6. Rolls K, J.S., Power D, Cook S, Flood K, Hennessy C, Mackenzie K, Robertson Y, Rodgers J, Blanchfield D, Kuzmiuk L and Fullbrook P., *Pressure Injury Prevention for Critically Ill Adults: a clinical practice guideline.* Agency for Clinical Innovation, 2014. **NSW Government**(Version 1): p. Chatswood NSW.
7. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and and Pan Pacific Pressure Injury Alliance, *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide.* Cambridge Media on behalf of National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance, 2014.
8. National Institute for Health and Care Excellence (NICE), *Pressure ulcers: prevention and management.* Clinical Guideline 179, 2014. **NICE, UK**.
9. Centre for Clinical Effectiveness. *Finding the Evidence: A guide to identifying the best available evidence to inform the development of procedures and clinical guidelines at Monash Health*. Available from: http://www.monashhealth.org/images/content/document/188689_1494304599.pdf.
10. International Centre for Allied Health Evidence. *iCAHE Guideline Quality Check List*. [cited 2017; Available from: http://www.unisa.edu.au/Global/Health/Sansom/Documents/iCAHE/iCAHE%20Guideline%20Quality%20Checklist.pdf.

Appendix 1

Ovid Medline 1946 to Present with Daily Update*			
1	exp Pressure Ulcer/	23	9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22
2	exp Skin Ulcer/	24	randomized controlled trial.pt.
3	(decubitus or decubital).mp.	25	controlled clinical trial.pt.
4	(skin adj3 breakdown$).mp.	26	randomized.ab.
5	(bedsore$ or (bed adj1 sore$)).mp.	27	placebo.ab.
6	(decubitus adj (ulce$ or sore$)).mp.	28	drug therapy.fs.
7	(pressure$ adj (wound$ or sore$ or ulcer$ or injur$ or damag$)).mp.	29	randomly.ab.
8	1 or 2 or 3 or 4 or 5 or 6 or 7	30	trial.ab.
9	exp Risk Assessment/	31	groups.ab.
10	((Braden) adj10 (score$ or scale$ or tool$ or assess$)).mp.	32	29 or 30 or 31 or 32 or 33 or 34 or 35 or 36
11	(risk adj2 assess$).mp.	33	exp animals/ not humans.sh.
12	((assess$ or predict$) adj10 (tool$ or score$ or scale$)).mp.	34	37 not 38
13	exp Nursing Assessment/	35	Meta-Analysis as Topic/
14	(wound$ adj assess$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	36	meta analy$.tw.
15	(bed sore$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	37	Meta-Analysis/
16	(decubit$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	38	(systematic adj (review$1 or overview$1)).tw.
17	(pressure ulcer$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	39	exp Review Literature as Topic/
18	(pressure sore$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	40	35 or 36 or 37 or 38 or 39
19	(bedsore$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	41	34 or 40
20	(pressure injur$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	42	8 and 23 and 41
21	(pressure damag$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.	43	limit 42 to (english language and humans and yr="2012 - Current")
22	(pressure wound$ adj10 (tool$ or score$ or scale$ or scoring or instrument$ or equipment$ or device$)).mp.		

*Search terms were adapted for CINAHL and Google.