

Evidence to Decision Frameworks: Recommendations for Skin and Tissue Assessment

Clinical question None

- Good Practice Statement 2.1** **Conduct a comprehensive skin and tissue assessment for all individuals at risk of pressure injuries:**
- **As soon as possible after admission/transfer to the healthcare service**
 - **As a part of every risk assessment**
 - **Periodically as indicated by the individual's degree of pressure injury risk**
 - **Prior to discharge from the care service**

Background: Skin and tissue assessment is important in pressure ulcer prevention, classification, diagnosis, and treatment

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence N/A

Justification Skin and tissue assessment is important in pressure ulcer prevention, classification, diagnosis, and treatment. The condition of skin and underlying tissue is an indicator of early signs of pressure damage,¹ therefore routine skin and tissue assessments provide an opportunity for early identification and treatment of skin alterations, including pressure injuries.

Clinical question

What are effective methods of assessing erythema?

Recommendation 2.2 Inspect the skin of individuals at risk of pressure injuries to identify presence of erythema.

Option: Visual inspection to identify presence of erythema
Comparison: No identification of erythema

Background: Pressure-induced erythema, can be identified visually by conducting a skin assessment. Visual evaluation is conducted with a focus on bony prominences.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS										
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	<table border="0"> <tr> <td>N/A</td> <td>Very low</td> <td>Low</td> <td>Moderate</td> <td>High</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	N/A	Very low	Low	Moderate	High	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Non-blanching erythema/Category/Stage I pressure injury as a predictor of Category/Stage II or greater pressure injuries</p> <ul style="list-style-type: none"> In people in acute care (n=109), there was a significantly increased odds of Category/Stage II pressure injury when assessed as having non-blanching erythema (odds ratio [OR] 7.98, 95% CI 2.36 to 39.97, p=0.002).² (Level 1 prognostic, high quality) In community hospitals and centers (n=634), there was a significantly increased odds of Category/Stage II pressure injury when assessed as having non-blanching erythema (OR 3.25, 95% CI 2.17 to 4.86, p<0.001).³ (Level 1 prognostic, high quality) In people in acute care (n=286), there was a significantly increased odds of developing a Category/Stage II pressure injury when assessed as having non-blanching erythema (OR 7.5, 95% CI 1.0 to 59.1, p=0.05).⁴ (Level 1 prognostic, low quality) In individuals in a chronic care hospital (n=2,771), there was a significantly increased odds of developing a Category/Stage II pressure injury or greater when assessed as having a Category/Stage I pressure injury (OR 3.1, 95% CI 2.4 to 4.1, p<0.001).⁵ (Level 3 prognostic, high quality) In individuals in acute and aged care settings (n=610), there was a significantly increased odds of Category/Stage II pressure injury when assessed as having non-blanching erythema (OR 5.36, 95% CI 2.40 to 11.99, p<0.001).⁶ (Level 2 prognostic, low quality) <p>Blanchable erythema as a predictor of Category/Stage II or greater pressure injuries</p> <ul style="list-style-type: none"> In individuals in acute care, critical care and non-surgical care (n=698), there was a significantly increased odds of Category/Stage II or greater pressure injury when assessed as having reddened skin (OR 2.305, p = not reported).⁷ (Level 3 prognostic, low quality) In aged care settings (n=91), there was a significantly increased odds of Category/Stage I or greater pressure injury based on severity of blanchable erythema (OR not reported).⁸ (Level 3 prognostic, low quality) In individuals in acute care, critical care and surgical care (n=161), there was a significantly increased odds of Category/Stage II or greater pressure injury when assessed as having reddened skin (OR not reported).⁹ (Level 3 prognostic, low quality) In individuals in acute care, critical care and non-surgical care (n=698), there was no significant relationship between pressure injuries and having hyperemic skin (OR not reported).⁷ (Level 3 prognostic, low quality) <p>Interrater reliability of using visualization alone to differentiate blanching and non-blanching erythema</p> <ul style="list-style-type: none"> There was moderate to good interrater reliability between two independent assessors evaluating 78 older adults with hip fractures (ranged from κ=0.67, 95% CI 0.5 to 0.82 to κ = 0.76, 95% CI 0.61 to 0.91 across time points).¹⁰ (Level 3, low quality) <p>Potential adverse effects No identified adverse effects</p> <p>Strength of Evidence for visual inspection: A - More than one high quality Level I study providing direct evidence</p>
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	Is there important uncertainty about how much people value the main outcomes?	<table border="0"> <tr> <td>Important uncertainty or variability</td> <td>Possibly important uncertainty or variability</td> <td>Probably no important uncertainty or variability</td> <td>No important uncertainty or variability</td> <td>N/A</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
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PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available.	
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FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The finger pressure method for differentiating blanching and non-blanching erythema takes only seconds to administer and is feasible to perform in any clinical setting.	
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Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input checked="" type="checkbox"/>
Justification	Ongoing skin assessment is necessary to detect early signs of pressure injury. Evidence from three Level 1 studies, one Level 2 study and a Level 3 study indicates that the presence of non-blanching erythema, a Category/Stage I pressure injury is predictive of development of a Category/Stage II or greater pressure injury. ²⁻⁶ Evidence from three Level 3 studies ⁷⁻⁹ indicates that the presence of reddened skin other than blanchable erythema is associated with Stage/Category II pressure injury development. Identifying presence of erythema alerts health professionals to the need for further assessment and potential development of a pressure injury prevention and/or treatment plan. Identification of erythema is a component of a skin inspection.				

Clinical question

What are effective methods of assessing erythema?

Recommendation 2.3

Differentiate blanchable from non-blanchable erythema using either finger pressure or the transparent disk method and evaluate the extent of erythema.

Option: Using the finger pressure method to differentiate non blanchable from blanchable erythema

Option: Using the transparent disk method to differentiate erythema

Comparison: Using other methods to differentiate erythema

Background: Pressure induced erythema, can be examined utilizing blanching techniques and visualization. The finger pressure method can be used to differentiate non blanchable from blanchable pressure-related erythema by pressing on the erythema for three seconds and assessing blanching following removal of the finger. Using the disk method, a transparent disk is used to apply pressure equally over an area of erythema and blanching is observed underneath the disk during its application. Blanching is a normal response and is indicative of an intact capillary bed. Blanchable erythema may be part of a normal reactive hyperemic response. Non-blanching indicates inflammatory changes in the capillary bed and possible pressure-induced damage despite intact skin (i.e. Category/Stage I pressure injury).

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	<p>Do the desirable effects outweigh the undesirable effects?</p>	<p>N/A Probably No Uncertain Probably Yes Yes Varies</p> <p><input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	<p>Interrater reliability of transparent disk method for differentiate blanching and non-blanching erythema</p> <ul style="list-style-type: none"> • There was excellent interrater reliability between researcher and nursing staff (K=0.89, 95% confidence interval [CI] 0.87 to 0.92) and between study nurses and nursing staff (K = 0.88, CI 0.85 to 0.91) when using the transparent disk method on all anatomical locations.¹³ (<i>Level 1 prognostic, high quality</i>) • Interrater reliability was good for transparent disk for assessing hospitalized adults (n=265) (ranged from κ=0.68 to κ=0.76 depending on experience of nurses.¹⁴ (<i>Level 2 diagnostic, high quality</i>) <p>Potential adverse effects No identified adverse effects</p> <p>Strength of Evidence: B1 - Level 2 studies of high or moderate quality providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained</p>	

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RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There is no evidence on the resource requirements for using the finger pressure method to differentiate blanching and non-blanching erythema. No equipment is required and the assessment is conducted during a full skin assessment so labor resources are minimal.	
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<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The finger pressure method for differentiating blanching and non-blanching erythema takes only seconds to administer and is feasible to perform in any clinical setting.	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input checked="" type="checkbox"/>
Justification	Evidence from a high quality Level 1 study indicates that presence of non-blanching erythema is predictive of development of a Category/Stage II pressure injury. ²⁻⁶ Evidence from high quality Level 2 and 3 studies indicated that the finger pressure method has strong psychometric properties for differentiating blanching and non-blanching erythema. ¹³⁻¹⁵ A low quality Level 4 study indicated that using the finger pressure method may be more reliable than the transparent disk method. ¹⁵				

Clinical question

Is evaluation of skin and tissue temperature an effective method of assessing the skin and soft tissue?

Recommendation 2.4

Assess the temperature of skin and soft tissue.

Option: Measuring skin and soft tissue temperature using palpation, infrared thermometer or infrared thermographic imaging

Comparison: Not conducting a skin temperature assessment, or using a different method of assessing skin and soft tissue temperature

Background: Skin temperature is proposed as an objective measure that can be used to assess the risk of a pressure injury by identifying changes in the tissue before they are identifiable in a visual assessment.¹⁶ Skin temperature is influenced by level of perfusion of underlying tissues, with lower temperatures indicative of poorer perfusion and higher temperatures indicative of inflammation.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for predicting pressure injuries using thermography</p> <ul style="list-style-type: none"> In people recruited in acute care (n=85), skin temperature at the site of a pressure-related intact area of discolored skin measured with infrared thermographic device was predictive of progression to skin necrosis at day seven of follow up, with cooler skin temperature being 31 times more likely to progress to necrosis (odds ratio [OR] 31.8, 95% confidence interval [CI] 3.8 to 263.1, p=0.001).¹⁶ (<i>Level 3 prognostic, moderate quality</i>) In primarily Caucasian adults (n=67), cooler skin temperatures (measured with an infrared thermographic device) at the center of the discolored area of intact skin as compared to the adjacent skin was more likely to develop necrosis by day 7 (OR 18.8, 95% CI 1.04 to 342.44).¹⁷ (<i>Level 1 prognostic, high quality</i>) <p>Evidence for accuracy of infrared thermal imaging for predicting pressure injuries</p> <ul style="list-style-type: none"> There was significantly higher likelihood than an adult (n=100) identified with infrared thermal imaging as being at high risk of a pressure injury would also be assessed at high risk using the Braden scale. The OR ranged from 6.8 (95% CI 4.3 to 10.8, p<0.0001) to 2.2 (95% CI 1.5 to 3.1, p<0.0001) depending on the health professional applying the evaluations.¹⁸ (<i>Level 3, low quality</i>) <p>Evidence for accuracy of inferred thermometer for measuring temperature change</p> <p>In healthy volunteers who were positioned for 60 minutes in supine position, temperature measured by infrared thermometer showed a significant increase between baseline and 60 minutes (p<0.001).¹⁹ (<i>Indirect evidence</i>)</p> <p>Potential adverse effects</p> <p>No evidence available</p> <p>Strength of Evidence: B1 - Level 1 studies of moderate or low quality providing direct evidence, most studies have consistent outcomes and inconsistencies can be explained</p>
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td>Not clear</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> <td>Varies</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There were no economic analyses relevant to this topic.	
Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In one study, 70% of health professionals involved in using infrared thermography to assess discolored skin did not believe it could be implemented in clinical practice. ¹⁷ (<i>Level 1 prognostic, high quality</i>)	
	No	Probably No	Uncertain	Probably Yes	Yes	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
Is the option a priority for key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	72.5% (278/383) of respondents to a patient/ informal caregiver survey who identified as having experienced a pressure injury or being at risk of a pressure injury believed that knowing more skin assessment is important or very important in caring for themselves. In the same survey, 67.5% (574/850) of informal caregivers believed that knowing more about skin assessment is important or very important in caring for their family member/friend with or at risk of a pressure injury. ^{11,12} (<i>Indirect evidence</i>)		
No	Probably No	Uncertain	Probably Yes	Yes	Varies											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> Average time to measure temperature of skin and tissue using infrared thermography was 3 to 5 minutes.¹⁷ (<i>Level 1 prognostic, high quality</i>) In one study, 70% of health professionals involved in using thermography to assess skin and tissue did not believe it could be implemented in clinical practice.¹⁷ (<i>Level 1 prognostic, high quality</i>) Access to appropriate equipment may be limited in some geographic areas. (<i>Expert opinion</i>) 	
No	Probably No	Uncertain	Probably Yes	Yes	Varies											
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input checked="" type="checkbox"/>	Weak positive recommendation: Probably do it <input checked="" type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	Evidence from a high quality Level 1 study ¹⁷ indicated that cooler temperature in the center of an area of skin discoloration was predictive of pressure injury development. A moderate quality Level 3 study ¹⁶ supported this finding. The research was primarily conducted in Caucasian women. ¹⁷ The evidence on feasibility and acceptability of implementing routine skin and soft tissue temperature assessment was mixed. Evidence on resource requirements for various methods of skin temperature measurement in different clinical settings is also lacking.				

Clinical question Is evaluation of skin and tissue moisture an effective method of assessing the skin and soft tissue?

Good Practice Statement **Assess edema and assess for change in tissue consistency in relation to surrounding tissues.**
2.5

Background: Skin and tissue assessment is important in pressure ulcer prevention, classification, diagnosis, and treatment.

SUPPORTING EVIDENCE, WHEN AVAILABLE

Evidence to support opinion N/A

Justification Skin and tissue assessment is important in pressure ulcer prevention, classification, diagnosis, and treatment. Localized heat, edema and change in tissue consistency in relation to surrounding tissue (e.g., induration/hardness) have all been identified as warning signs for pressure ulcer development.^{14,20-22}

Clinical question Is evaluation of skin and tissue moisture an effective method of assessing the skin and soft tissue?

Recommendation 2.6 Consider using a sub-epidermal moisture/edema measurement device as an adjunct to routine clinical skin assessment.

Option: sub-epidermal moisture measurement devices
Comparison: clinical visual assessment

Background: A subepidermal moisture measurement (SEM) device is a medical device that measures capacitance, providing a relative measure of water in sub-epidermal tissues that is essentially a measure of soft tissue edema and potentially a marker for inflammation.²³

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATION
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for predicting erythema (moderate or severe skin discoloration with blanching)/Category/Stage I pressure injuries</p> <p>In older adults (n=31), a SEM measurement device predicted incidence of erythema and/or Category/Stage I pressure injuries identified one week later, when adjusting for concurrent SEM and Braden scale risk status (odds ratio [OR] 1.003, 95% confidence interval [CI] 1.000 to 1.006, OR 1.32 per 100 dermal phase units [DPU]).²⁴ (Level 3 prognostic, moderate quality)</p> <ul style="list-style-type: none"> In older adults with light skin (n=55), SEM measurements predicted incidence of erythema and Category/Stage I pressure injuries (OR 2.11 per 300 DPU, 95% CI 1.06 to 4.20, p<0.05).²³ (Level 3 prognostic, moderate quality) In older adults with dark skin (n=11), SEM measurements predicted incidence of erythema and Category/Stage I pressure injuries (OR 5.31 per 50 DPU, 95% CI 1.87 to 15.11, p<0.05).²³ (Level 3 prognostic, moderate quality) In older adults (n=29), SEM measurements increased with the higher stage of skin damage (normal skin 216.3 vs blanching erythema 232.3 vs Category/Stage I pressure injury 387.6, p=0.013; blanching erythema OR = 1.003, p=0.047; erythema OR = 1.004, p=0.011).²⁵ Level 3 prognostic, low quality) In adults with jaundice (n=22), SEM measurements increased with the higher stage of skin damage (normal skin 115.9±32.6 vs blanching erythema 164.8±107.5 vs Category/Stage I pressure injury 208.7±76.5, <0.001; blanching erythema OR = 1.016, p<0.001).²⁶ Level 3 prognostic, low quality) <p>Evidence for predicting Category/Stage II or greater pressure injuries</p> <ul style="list-style-type: none"> In older adults (n=31), SEM measurements predicted development of Category/Stage II or greater pressure injuries identified by visual skin assessment within one week of the SEM reading (OR 1.32 per 100 DPU).²⁴ (Level 3 prognostic, moderate quality) In older adults with light skin (n=55), SEM measurements predicted development of Category/Stage II or greater pressure injuries identified visually within one week of the SEM reading (OR 4.30 per 300 DPU, 95% CI 1.42 to 13.0, p<0.05).²³ (Level 3 prognostic, moderate quality) In older adults with dark skin tone (n=11), SEM measurements predicted development of Category/Stage II or greater pressure injuries identified visually within one week of the SEM reading (OR 8.51 per 50 DPU, 95% CI 1.95 to 371, p<0.05; and OR 13.06 per 150 DPU, 95% CI 2.60 to 65.56, p<0.05).²³ (Level 3 prognostic, moderate quality) 	The studies used three different SEM scanners. However, SEM measurements were highly correlated between devices in a study that trialed three different models (r>0.80). ³⁰ (Indirect evidence)
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input checked="" type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>		
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>		
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>		
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>		

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATION
			<p>Evidence for psychometric properties</p> <ul style="list-style-type: none"> In adults considered at risk of pressure injury (n=47), correlation between visual skin assessment and SEM measurements was strong for sacrum (r=0.65) and moderate to low for heels (r=0.43 to r=0.23).²⁷ <i>(Level 2 diagnostic, high quality)</i> In adults considered at risk of pressure injury (n=47), sensitivity was 100% (95% CI 83.89% to 100%) and specificity was 83.33% (95% CI 75.44% to 89.51%) for a SEM measurement device.²⁷ <i>(Level 2 diagnostic, high quality)</i> In people with spinal cord injury (SCI), relative error in short term repeat measures by SEM measurement device was 2.5% (95% CI 2.0 to 2.9%). First readings using SEM were higher in 85% of repeat readings, suggesting repeated measures were not independent.²⁸ <i>(Level 3, low quality)</i> In healthy volunteers (N=13), interrater reliability for two pairs of raters was very high (r=0.92 and r=0.86).²⁹ <i>(Level 4, moderate quality)</i> In healthy volunteers (n=31), interoperator (4 operators) and inter-device reliability (3 devices) were all above 0.80 for four anatomical sites.³⁰ <i>(Indirect evidence)</i> <p>Potential adverse effects No adverse events were reported in the available literature</p> <p>Strength of Evidence: B2 – Level 3 or 4 studies (regardless of quality) providing direct evidence</p>	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td>Not clear</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> <td>Varies</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> One study suggested that using a SEM scanner on individuals assessed as having a high pressure injury risk would be associated with cost savings of £29,000 for a surgical ward, achieved in reducing over-prescription of alternating pressure support surfaces and reduced need for antibiotics and wound dressings from putting in place appropriate pressure injury prevention plans based on SEM data (UK pounds in 2017).³¹ In the same study, there was an estimated saving of 1,420 nursing hours and estimated revenue increase of £53,000 based on bed admissions saved from putting in place appropriate pressure injury prevention plans based on SEM data.³¹ 	
Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
	No	Probably No	Uncertain	Probably Yes	Yes	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	72.5% (278/383) of respondents to a patient/ informal caregiver survey who identified as having experienced a pressure injury or being at risk of a pressure injury believed that knowing more skin assessment is important or very important in caring for themselves. In the same survey, 67.5% (574/850) of informal caregivers believed that knowing more about skin assessment is important or very important in caring for their family member/friend with or at risk of a pressure injury. ^{11,12} (Indirect evidence)	
No	Probably No	Uncertain	Probably Yes	Yes	Varies											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Access to SEM scanners is likely to be limited in many geographic locations and clinical settings. SEM scanners were feasible to use in inpatient clinical settings when taking daily or weekly. Taking a SEM measurement took on average eight seconds.³² (Level 4, moderate quality) 	
No	Probably No	Uncertain	Probably Yes	Yes	Varies											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input checked="" type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	Evidence from a high quality Level 2 study, ²⁷ moderate and low quality Level 3 studies ^{23-26,28} and a moderate quality Level 4 study ³² indicated that a sub-epidermal moisture (SEM) measurement can be used as a measure for tissue edema. In a high quality Level 2 study, ²⁷ SEM measurements strongly correlated to a visual skin assessment at the sacrum, but measures taken at the heel had a moderate to low correlations with the visual assessment. Some evidence from moderate quality Level 3 studies ^{23,24} suggested that SEM measurements are predictive of Category/Stage I or greater pressure injuries occurring within one week. Studies showed high sensitivity and specificity, and high interrater reliability for SEM measurements, ^{30,32} but low quality and indirect evidence on repeat-measure reliability was conflicting. ^{28,30} There was no evidence on the correlation between SEM measurements and palpation.				

Clinical question What methods are effective for assessing skin and soft tissue in individuals with darkly pigmented skin?

Recommendation 2.7 When assessing darkly pigmented skin, consider assessment of skin temperature and sub-epidermal moisture as important adjunct assessment strategies.

Option: Subepidermal moisture (SEM) to predict skin injury

Option: Thermography

Comparison: Comparing individuals with light and dark skin tones

Background: Visual assessment to detect early pressure injury is difficult in darker tone skin tones. Individuals with dark skin tones have been shown to have a higher rate of pressure injuries than those with light skin tones.³³ A handheld dermal phase meter to measure subdermal moisture may have clinical value in darker skin.

Skin temperature is proposed as an objective measure that can be used to assess the risk of a pressure injury by identifying changes in the tissue before they are identifiable in a visual assessment.¹⁶

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for predicting pressure injuries with SEM measurement</p> <ul style="list-style-type: none"> Among individuals with darker skin tones (n=11), SEM values predicted the incidence of Category/Stage I pressure injuries occurring one week later (odds ratio [OR] 1.88 per 100 dermal phase unit [DPU] change, p<0.005).²³ (Level 3 prognostic, moderate quality) Among individuals with darker skin tones (n=11), SEM values detected the incidence of Category/Stage II or greater pressure injuries occurring one week later (OR 1.02 per 1 DPU, 95% confidence interval [CI] 1.001 to 1.02; OR 1.15 per 100 DPU, p<0.005).²³ (Level 3 prognostic, moderate quality) <p>Evidence for preventing pressure injuries with skin temperature evaluation</p> <ul style="list-style-type: none"> In aged care, health professional education on skin assessment using the hand to identify changes in skin temperature was associated with a significant reduction in Category/Stage I to IV pressure injuries for residents with dark skin tones (p < 0.004).³⁴ (Level 2, moderate quality) <p>Evidence for predicting pressure injuries with skin temperature evaluation</p> <ul style="list-style-type: none"> In people recruited in acute care (n = 85), individuals dark toned skin were 3.8 times higher likelihood than white toned skin of developing skin necrosis Within seven days of a skin temperature measurement that identified cooler skin indicative of suspected deep tissue injury.¹⁶ (Level 3 prognostic, moderate quality) <p>Potential adverse effects No evidence available</p> <p>Strength of Evidence: B2 - Level 3 or 4 studies (regardless of quality) providing direct evidence</p>
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No economic analysis identified	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available	
	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	72.5% (278/383) of respondents to a patient/ informal caregiver survey who identified as having experienced a pressure injury or being at risk of a pressure injury believed that knowing more skin assessment is important or very important in caring for themselves. In the same survey, 67.5% (574/850) of informal caregivers believed that knowing more about skin assessment is important or very important in caring for their family member/friend with or at risk of a pressure injury. ^{11,12} (<i>Indirect evidence</i>)	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Access to may be limited in some geographic regions and clinical settings (<u>Expert opinion</u>).	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input checked="" type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	<p>One small, moderate quality Level 3 study¹⁶ identified that cooler pressure injury related intact skin was more likely to develop into skin necrosis within seven days; and darker skinned individuals had 3.8 times higher likelihood of developing skin necrosis.¹⁶ One moderate quality Level 2 study³⁴ identified that an intervention focused on educating health professionals in conducting a comprehensive skin assessment that included using touch to identify changes in skin temperature was associated with a significant reduction in pressure injuries in dark skinned individuals.</p> <p>There is evidence from one, small, moderate quality Level 3 study²³ indicating that SEM measurements are able to identify tissue edema one week prior to pressure injury development in individuals with dark skin tone. No evidence was available on the resource requirements for implementing SEM scanning for all dark-skinned individuals.</p>				

Clinical question What methods are effective for assessing skin and soft tissue in individuals with darkly pigmented skin?

Recommendation 2.8 Evaluate the relevance of performing an objective assessment of skin tone using a color chart when conducting a skin assessment.

Option: The Munsell System of Color Notation (Munsell Chart) to objectively assess skin tone.

Comparison: Categorizing skin as dark/light or classifying skin tone skin based on ethnicity.

Background: Darker skin tones are reported to have high rates of pressure injuries, possibly due to difficulty observing skin changes. The 5YR Munsell Color Chart can be used to classify skin tones from a variety of ethnic/racial groups and might be used to evaluate pressure injury risk.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE PRACTICE	What is the overall certainty of the evidence?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for predictive properties</p> <ul style="list-style-type: none"> In older adults from a range of ethnic backgrounds (n=417), skin tone categorization using Munsell ratings predicted the incidence of Category/Stage I pressure injuries (p=0.003).³⁵ (Level 3 prognostic, moderate quality) In older adults from a range of ethnic backgrounds (n=417), skin tone categorization using Munsell ratings were not predictive of incidence of Category/Stage II or greater pressure injuries (p>0.05).³⁵ (Level 3 prognostic, moderate quality) <p>Reliability</p> <ul style="list-style-type: none"> For all ethnic groups, interrater reliability for Munsell ratings at the buttocks at baseline was high (interclass coefficient [ICC] r=0.97, K=0.84, p<0.001).³⁵ (Level 3 prognostic, moderate quality) Interrater reliability was highest when rating African Americans (r=0.93, p<0.001) and lowest for Caucasians (r=0.91, p<0.001). (Level 3 prognostic, moderate quality) For all ethnic groups, intrarater reliability for Munsell ratings was consistent from baseline to 16 weeks for arms (r=0.85 from baseline to 16 weeks), and buttocks (r=0.91 from baseline to 16 weeks).³⁵ (Level 3 prognostic, moderate quality) <p>Adverse events No evidence available</p> <p>Strength of Evidence: B2 - Level 3 or 4 studies (regardless of quality) providing direct evidence</p>	Consistency of skin color ratings across anatomical sites (arms versus buttocks) was highest for individuals with darker skin (African-American, ICC r=0.83, p<0.001). ³⁵ (Level 3 prognostic, moderate quality)
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>		
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>		
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>		
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>		

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td>Not clear</td> <td>Not substantial</td> <td>Probably not substantial</td> <td>Probably substantial</td> <td>Substantial</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No economic analyses were identified. Use of a skin color chart was reported to take only one minute of nursing time to administer, suggesting limited economic impact of performing this assessment. ³⁵ (Level 3 prognostic, moderate quality)
Not clear	Not substantial	Probably not substantial	Probably substantial	Substantial	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available
	No	Probably No	Uncertain	Probably Yes	Yes	Varies									
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
Is the option a priority for key stakeholders?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	72.5% (278/383) of respondents to a patient/ informal caregiver survey who identified as having experienced a pressure injury or being at risk of a pressure injury believed that knowing more skin assessment is important or very important in caring for themselves. In the same survey, 67.5% (574/850) of informal caregivers believed that knowing more about skin assessment is important or very important in caring for their family member/friend with or at risk of a pressure injury. ^{11,12} (Indirect evidence)	
No	Probably No	Uncertain	Probably Yes	Yes	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td>No</td> <td>Probably No</td> <td>Uncertain</td> <td>Probably Yes</td> <td>Yes</td> <td>Varies</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	No	Probably No	Uncertain	Probably Yes	Yes	Varies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A skin tone color chart can be administered quickly (less than one minute) and staff require minimal training (15 minutes) to achieve high inter-rater reliability. ³⁵ (Level 3 prognostic, moderate quality)
No	Probably No	Uncertain	Probably Yes	Yes	Varies										
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>										

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input checked="" type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input checked="" type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Justification	Evidence from a logistic regression reported in a moderate quality Level 3 study showed that skin tone classification on a Munsell color chart was a significant predictor of Category/Stage I pressure injuries (but not more severe pressure injuries). Ethnicity/race was not a significant predictor of pressure injuries. Interrater and intrarater reliability was high for Munsell-based skin tone classifications, especially in individuals with dark skin tones. ³⁵				

Clinical question What additional technologies are accurate and effective methods of assessing skin and soft tissue?

Measurements of skin assessment using non-invasive optical instruments (e.g. transcutaneous oxygenation monitoring; laser doppler, and photoplethysmography)

Option: Using a noninvasive optical instrument to assess skin and soft tissue
Comparison: Another measure of skin and soft tissue assessment

Background: Optical instruments can measure blood flow at different tissue depths depending on wavelength used. These instruments may have the potential to provide a noninvasive method for assessing signs of tissue ischemia due to pressure.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE AND ADDITIONAL CONSIDERATIONS
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Evidence for assessing skin and soft tissue by using tissue oxygenation monitoring</p> <ul style="list-style-type: none"> In individuals recruited from a university hospital (n=46), assessment of skin and tissue using tissue oxygenation did not identify any significant differences in mean sacral oxygenation during a four hour measurement period in supine position on a pressure redistribution support surface.³⁶ (<i>Level 4, moderate quality</i>) In healthy volunteers (n=20), there was a significant increase in transcutaneous tissue oxygenation between baseline and 15 minutes at the sacrum (p>0.05) and the ischial tuberosity (p<0.01) in the supine position.³⁷ (<i>Indirect evidence</i>) In healthy volunteers (n=20), there was no significant differences in transcutaneous tissue oxygenation between baseline and 15 minutes in a sitting position.³⁷ (<i>Indirect evidence</i>) <p>Evidence for assessing skin and soft tissue using Laser Doppler and photoplethysmography</p> <ul style="list-style-type: none"> In healthy volunteers (n=11) both laser Doppler flowmetry and photoplethysmography (PPG), were able to measure changes in blood flow in situations without pressure present.³⁸ (<i>Indirect evidence</i>) In healthy volunteers (n=20) both laser Doppler flowmetry and PPG were able to measure significant increases in blood flow from baseline to 60 minutes measured at the back and sides in supine position.³⁹ (<i>Indirect evidence</i>) <p>Potential adverse effects No evidence on adverse events was available.</p> <p>Strength of Evidence: C - Level 5 studies (indirect evidence) e.g., studies in normal human subjects, humans with other types of chronic wounds, animal models</p>
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No important uncertainty or variability <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	There were no economic analyses relevant to this topic.	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The equipment has primarily been used by researchers.	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	These measurement methods have been used for research, but there is currently no user-friendly product available in health care.	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input checked="" type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Recommendation (text)	No recommendation				
Justification	N/A				

Clinical question Is ultrasound an effective method for assessing the skin and soft tissue?

Using ultrasound to diagnose or predict development of pressure injuries

Option: Using ultrasound

Comparison: Using another diagnostic tool

Background: Ultrasound is sound waves with frequencies higher than the upper audible limit of human hearing.

Ultrasonic devices are used to detect objects and measure distances. Ultrasound imaging or sonography is often used in medicine.

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE
BENEFITS & HARMS OF THE RECOMMENDED PRACTICE	What is the overall certainty of the evidence of effectiveness?	N/A <input checked="" type="checkbox"/> Very low <input type="checkbox"/> Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>	<p>Diagnostic accuracy for deep tissue injury compared to daily visual skin assessment</p> <ul style="list-style-type: none"> Low frequency ultrasound of tissues compared to daily visual skin assessment by a wound ostomy nurse for 7 days had 100.0% sensitivity (95% confidence interval [CI] 47.8% to 100%), 74.8% specificity (95% CI 69.5% to 79.7%) and 75.3% accuracy in identifying deep tissue injury. The ultrasound transducer generated a range of transmission frequencies (2.5 to 12 MHz) and the frequency was selected based on the individual's body mass index (BMI).⁴⁰ (<i>Level 1 diagnostic, high quality</i>) Abnormal high-frequency ultrasound scans at the heels showed low correlation to visual assessment and application of Braden scale friction/shear sub-scales ($r=0.22$ to $r=0.337$ across left/right heels and across four different measurement times, some of which were significant).⁴¹ (<i>Level 3 prognostic, high quality</i>) <p>Reliability</p> <ul style="list-style-type: none"> When applied to people with spinal cord injury (SCI) at risk of pressure injuries, interrater reliability ranged from interclass coefficient (ICC) 0.75 to 0.97 for ultrasound identification of deformation in unloaded and loaded sitting for measures of muscle, total, tendon/muscle and skin/fat.⁴² (<i>Indirect evidence</i>) For people with SCI at risk of pressure injuries, interrater reliability was low for identification of deformation in unloaded and loaded sitting for measures of fat and skin.⁴² (<i>Indirect evidence</i>) <p>Potential adverse effects</p> <p>No reported adverse effects.</p> <p>Strength of Evidence: C—A body of evidence with inconsistencies that cannot be explained, reflecting genuine uncertainty surrounding the topic</p>
	Is there important uncertainty about how much people value the main outcomes?	Important uncertainty or variability <input type="checkbox"/> Possibly important uncertainty or variability <input type="checkbox"/> Probably no important uncertainty or variability <input type="checkbox"/> No known undesirable outcomes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	
	How substantial are the desirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	How substantial are the undesirable anticipated effects?	N/A <input checked="" type="checkbox"/> Not substantial <input type="checkbox"/> Probably not substantial <input type="checkbox"/> Probably substantial <input type="checkbox"/> Substantial <input type="checkbox"/>	
	Do the desirable effects outweigh the undesirable effects?	No <input type="checkbox"/> Probably No <input type="checkbox"/> Uncertain <input type="checkbox"/> Probably Yes <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	

	CRITERIA	JUDGEMENTS	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS												
RESOURCE USE	How substantial are the resource requirements?	<table border="0"> <tr> <td><i>Not clear</i></td> <td><i>Not substantial</i></td> <td><i>Probably not substantial</i></td> <td><i>Probably substantial</i></td> <td><i>Substantial</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available.	
<i>Not clear</i>	<i>Not substantial</i>	<i>Probably not substantial</i>	<i>Probably substantial</i>	<i>Substantial</i>	<i>Varies</i>											
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
PRIORITY AND ACCEPTABILITY	Is the option acceptable to key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No evidence available.	
	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>										
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
	Is the option a priority for key stakeholders?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In an international survey of patient consumers and their informal caregivers, 46.5% (178/383) of patients identified knowing more about strategies to check that skin is healthy as important or very important. 67.5% (574/850) informal caregivers identified this topic was important or very important. The survey did not specifically explore perceptions of ultrasound assessment of the skin. ^{11,12} (<i>Indirect evidence</i>)	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
FEASIBILITY	Is the option feasible to implement?	<table border="0"> <tr> <td><i>No</i></td> <td><i>Probably No</i></td> <td><i>Uncertain</i></td> <td><i>Probably Yes</i></td> <td><i>Yes</i></td> <td><i>Varies</i></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table>	<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Feasibility of implementation is dependent on access to equipment and staff training and this is likely to be limited in many geographic regions and healthcare settings. (<i>Expert opinion</i>)	
<i>No</i>	<i>Probably No</i>	<i>Uncertain</i>	<i>Probably Yes</i>	<i>Yes</i>	<i>Varies</i>											
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>											

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings <input type="checkbox"/>	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings <input type="checkbox"/>	The balance between desirable and undesirable consequences <i>is closely balanced or uncertain</i> <input checked="" type="checkbox"/>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings <input type="checkbox"/>	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings <input type="checkbox"/>
Strength of recommendation	Strong negative recommendation: Definitely don't it <input type="checkbox"/>	Weak negative recommendation: Probably don't do it <input type="checkbox"/>	No specific recommendation <input type="checkbox"/>	Weak positive recommendation: Probably do it <input type="checkbox"/>	Strong positive recommendation: Definitely do it <input type="checkbox"/>
Recommendation (text)	No recommendation				
Justification	<p>There is one high quality Level 1 diagnostic study⁴⁰ in which use of low frequency ultrasound showed good sensitivity, specificity and accuracy in diagnosing deep tissue injury, confirmed with visual assessment and pressure injury staging by a clinician conducted up to 7 days after the ultrasound. One high quality Level 3 study demonstrated low to moderate correlation between an abnormal high frequency ultrasound result and being classified as having a pressure injury risk based on visual assessment and application of the Braden friction/shear subscales. The study had insufficient pressure injury events to evaluate the ability of ultrasound to predict a pressure injury developing.⁴¹ Indirect evidence suggests that tissue deformation associated with pressure injury is identifiable, with interrater reliability reported as high for identifying deformation in muscle, tendon/muscle and skin/fat layers but low for measures in the fat and skin layers.⁴²</p>				

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