



# How to Predict Pediatric Pressure Injury Risk with the Braden QD Scale

This valid, reliable instrument can identify patients at risk for pressure-related injuries from medical devices as well as immobility.

**ABSTRACT:** The Braden QD Scale is a conceptually based, pediatric-specific, risk assessment instrument that reliably predicts both immobility-related and medical device-related pressure injuries in the pediatric acute care environment. A revision and simplification of the commonly used Braden Q Scale, the Braden QD Scale can be used to assess risk among the wide range of infants, children, and adolescents commonly treated in acute care environments. As part of a comprehensive program to prevent hospital-acquired pressure injuries, the Braden QD Scale promotes patient safety, quality of care and care monitoring, and effective resource use in pediatric hospitalized patients. The authors provide guidance on using the Braden QD Scale to assess pediatric patients and score their risk of pressure-related injury in numerous scenarios frequently encountered in acute care practice.

**Keywords:** Braden QD Scale, Braden Q Scale, Braden Scale, hospital-acquired pressure injury, pediatric assessment, pressure injury, pressure ulcer, risk prediction

Over the past several decades, pediatric nurses have made significant progress in preventing pressure-related injuries in vulnerable infants and children. Immobility-related pressure injuries have decreased significantly, and most hospital-acquired pressure injuries are associated with the use of medical devices that are attached to or traverse the patient's skin or mucus membranes.<sup>1,2</sup>

The first step in pressure injury prevention is the identification of patient risk. Once identified, risk may be mitigated. For example, the risk of device-related

pressure injury may be abated if the device can be repositioned and the tissue beneath or surrounding it can be protected.<sup>1,3</sup> While a number of reliable and valid risk assessment tools, such as the Braden Scale and the Norton Scale, are available for use in assessing adult populations for pressure injury risk, this has not been the case with hospitalized children, who often experience both immobility and risk of injury from medical devices.

The Braden QD Scale is a revision and simplification of the commonly used Braden Q Scale.

An easy-to-use, valid, reliable, pediatric-specific pressure injury risk assessment tool, the Braden QD Scale helps clinicians better understand the risk factors and accurately predicts which patients are and are not at risk for hospital-acquired pressure injury. Here, we provide background on the development and conceptual framework of the Braden QD Scale and offer guidance on using this tool to assess and score pediatric patients' risk of pressure injury in commonly encountered acute care scenarios.

### DEVELOPMENT AND CONCEPTUAL FRAMEWORK OF THE BRADEN QD SCALE

**The Braden Scale**, developed by Braden and Bergstrom in 1987 to study the etiology of pressure ulcers in adults, posits that the critical factors in pressure ulcer development are pressure and tissue tolerance.<sup>4,5</sup> The Braden Scale provided the conceptual basis for the Braden Q Scale, developed by Quigley and Curley in 1996 to predict immobility-related pediatric pressure ulcer risk.

**The Braden Q Scale**—so named for the Braden Scale and authors Quigley and Quatrano (Curley's maiden name), who modified it, with permission, for use in pediatric patients—incorporated the six Braden subscales (sensory perception, moisture, activity, mobility, nutrition, and friction and shear), but added a seventh for assessing tissue perfusion and oxygenation, and took into account the unique developmental needs of pediatric patients, the prevalence of enteral tube feedings, and the availability of both blood studies and noninvasive technology.<sup>4,6</sup> A 2003 multisite prospective cohort study of 322 patients, ages three weeks to eight years, who were receiving treatment in a pediatric ICU and were on bed rest for at least 24 hours, established the predictive validity of the Braden Q Scale.<sup>7</sup> With a score of 16, the sensitivity and specificity of the Braden Q Scale was 88% and 58%, respectively, comparable to that of the adult-based Braden Scale, which has a sensitivity and specificity of 83% and 64%, respectively.<sup>7</sup> The Braden Q Scale has since been translated into many languages and is widely used in pediatric hospitals all over the world.

Despite its widespread use, however, the Braden Q Scale has several important limitations. First, the instrument did not address device-related pressure injuries. Second, initial validation testing excluded several pediatric cohorts, such as neonates younger than three weeks of age, children over age eight, and patients diagnosed with congenital heart disease.<sup>7</sup>

**The Braden QD Scale**, a revised and simplified version of the Braden Q Scale, was developed to address these limitations. The Braden QD Scale addresses the risk of device-related pressure injury (the “D” in QD), as well as the risk of immobility, in children from the



In children, most hospital-acquired pressure injuries are related to medical devices rather than to immobility. A device that can't be repositioned, such as this cast, presents additional risk. Photo by Rafael Ben-Ari / Alamy Stock Photo.

youngest of neonates to those over age eight.<sup>1</sup> It was validated in a multicenter prospective cohort study of 625 patients, ages preterm to 21 years, who were on bed rest for at least 24 hours and had a medical device in place.<sup>1</sup> To ensure generalizability from the study population to acute care pediatrics, enrollment was stratified by age, patient type (medical–surgical or cardiovascular), and hospital unit (pediatric ICU or non-ICU).<sup>1</sup> At a cutoff score of 13, the Braden QD Scale was found to have a sensitivity of 86% and a specificity of 59%,<sup>1</sup> similar to that of the Braden Q Scale, which at a cutoff score of 16 was found to have a sensitivity of 88% and a specificity of 58%.<sup>7</sup> (See *Understanding Sensitivity and Specificity*.)<sup>1</sup> The Braden QD Scale provides pediatric nurses with a single instrument with which to assess both immobility-related and medical device–related pressure injury risk across a diverse clinical population typically cared for in children's hospitals.

### USING THE BRADEN QD SCALE

As part of a pressure injury prevention program, a complete skin assessment, including the use of a risk assessment tool such as the Braden QD Scale, should be completed within 24 hours of patient hospitalization. All pressure injuries that are identified on admission should be documented in the medical record and reported to the primary care team.

The frequency of performing a risk assessment using the Braden QD Scale should be matched to the patient population, following institutional standards. For example, an acutely ill patient population requires more frequent risk assessment than a healthy postoperative population. Patients who are on bed rest, have limited mobility or sensation, or are critically ill should be assessed at least once daily but may benefit from more frequent assessments. Chronically hospitalized patients whose Braden QD Scale scores are unchanged may require no more than a weekly assessment. The frequency of assessment should be adjusted with any change in the patient's clinical condition. Likewise, appropriate risk reduction interventions should be initiated in patients deemed at risk for pressure injury and should be adjusted in accordance with any change in either risk level or condition.

The Braden QD Scale should be used only as originally designed and intended, on pediatric patients in an acute care setting ranging in age from preterm to 21 years. In mixed pediatric and adult facilities, we recommend using the Braden QD Scale for the pediatric population and the Braden Scale for the adult population. In electronic documentation systems, all Braden QD subscale headings should be visible and have a clickable link to reference text or a hover option that describes how each is scored. The Braden QD Scale is "open source," so that permission to use an unmodified version of the Braden QD Scale is

not required. When the scale is reproduced, proper citation is required (© 2017 Martha A. Q. Curley).

### THE BRADEN QD SUBSCALES AND SCORING METHODS

The Braden QD Scale, like the Braden Q Scale, comprises seven subscales, the first five of which constitute two broad areas of assessment—*intensity and duration of pressure* and *tolerance of the skin and supporting structure*.<sup>1,7</sup> The Braden QD Scale, however, introduces a new broad area of assessment—*medical devices*—containing two new subscales to assess medical device-related pressure injury risk (number of medical devices and repositionability/skin protection), eliminates two Braden Q Scale subscales (activity and moisture), and reduces the scoring options for each subscale from four (1, 2, 3, 4) to three (0, 1, 2).<sup>1,7</sup> (See Table 1.<sup>1,7</sup>) The sum of the scores of each of the seven subscales provides an overall risk score that may range from 0 (lowest risk) to 20 (highest risk), with scores of 13 or higher indicating risk.<sup>1</sup> By contrast, the Braden Q Scale scores ranged from 28 (lowest risk) to 7 (highest risk), with scores of 16 or lower indicating risk.<sup>7</sup> With the Braden QD Scale, scoring begins with a physical assessment of the patient followed by a medical record review when necessary.

In the following sections, we discuss each of the seven subscales (organized as they appear in the tool within the three broad areas of assessment) and give examples of various patient scenarios and how the patient's risk of pressure injury would be scored using the Braden QD Scale. Refer to the Braden QD Scale itself (see Figure 1) for a description of each subscale and the scoring options.

### INTENSITY AND DURATION OF PRESSURE

**Mobility.** The risk posed by mobility status may be assessed regardless of the patient's location or position. The focus is on the patient's ability to change position. Infants too young to roll over independently are assigned a score of 1, but those unable to move because of sedation or paralysis are assigned a score of 2. In the patient scenarios below, patient mobility would be scored as follows:

- A five-year-old postoperative patient who can completely turn in bed without assistance. **Score: 0**
- A 20-day-old otherwise healthy premature neonate. **Score: 1**
- A 10-year-old with hemiparesis of the left extremities. **Score: 1**
- A six-year-old in lower extremity traction. **Score: 1**
- A three-month-old developmentally appropriate infant with good head control, but not yet rolling over back to front. **Score: 1**
- A child with the ability to move upper extremities and torso, limited ability to move lower extremities, and an epidural catheter in place for pain control. **Score: 1**

### Understanding Sensitivity and Specificity

**Sensitivity:** Statistical sensitivity describes the percentage of people with a disease, condition, or risk that a test correctly identifies as having that disease, condition, or risk—that is, the true positives. The sensitivity of the Braden QD Scale thus describes the percentage of patients who developed a pressure injury and were assessed as being at risk for a pressure injury by clinicians using the Braden QD Scale. With a sensitivity of 86% at a cutoff score of 13, the Braden QD Scale correctly identified 86% of the patients in a recent prospective study who developed a pressure injury.<sup>1</sup>

**Specificity:** Statistical specificity describes the percentage of people who do not have a disease, condition, or risk that a test correctly identifies as not having that disease, condition, or risk—that is, the true negatives. The specificity of the Braden QD Scale thus describes the percentage of patients who did not develop a pressure injury and were assessed as not being at risk for a pressure injury by clinicians using the Braden QD Scale. With a specificity of 59% at a cutoff score of 13, the Braden QD Scale correctly identified 59% of the patients in this same study who did not develop a pressure injury.<sup>1</sup>

**Why is this important?** The benefit of preventing pressure injury in patients who are at risk exceeds the risk of implementing preventive interventions in patients who are at low risk. For this reason, a risk assessment tool with high sensitivity is desired.

Figure 1. The Braden QD Scale

Braden QD Scale				
Intensity and Duration of Pressure				Score
<b>Mobility</b> The ability to independently change & control body position	<b>0. No Limitation</b> Makes major and frequent changes in body or extremity position independently.	<b>1. Limited</b> Makes slight and infrequent changes in body or extremity position <b>OR</b> <u>unable</u> to reposition self independently (includes infants too young to roll over).	<b>2. Completely Immobile</b> Does not make even slight changes in body or extremity position independently.	
<b>Sensory Perception</b> The ability to respond meaningfully, in a <b>developmentally</b> appropriate way, to pressure-related discomfort	<b>0. No Impairment</b> Responsive <b>and</b> has no sensory deficits which limit ability to feel or communicate discomfort.	<b>1. Limited</b> Cannot always communicate pressure-related discomfort <b>OR</b> has some sensory deficits that limit ability to feel pressure-related discomfort.	<b>2. Completely Limited</b> Unresponsive due to diminished level of consciousness or sedation <b>OR</b> sensory deficits limit ability to feel pressure-related discomfort over most of body surface.	
Tolerance of the Skin and Supporting Structure				
<b>Friction &amp; Shear</b> <i>Friction:</i> occurs when skin moves against support surfaces <i>Shear:</i> occurs when skin & adjacent bony surface slide across one another	<b>0. No Problem</b> Has sufficient strength to completely lift self up during a move. Maintains good body position in bed/chair at all times. Able to completely lift patient during a position change.	<b>1. Potential Problem</b> Requires <b>some</b> assistance in moving. Occasionally slides down in bed/chair, requiring repositioning. During repositioning, skin often slides against surface.	<b>2. Problem</b> Requires <b>full</b> assistance in moving. Frequently slides down and requires repositioning. Complete lifting without skin sliding against surface is impossible <b>OR</b> spasticity, contractures, itching or agitation leads to almost constant friction.	
<b>Nutrition</b> Usual diet for age – assess pattern over the most recent 3 consecutive days	<b>0. Adequate</b> Diet for age providing <b>adequate</b> calories & protein to support metabolism and growth.	<b>1. Limited</b> Diet for age providing <b>inadequate</b> calories <b>OR</b> <b>inadequate</b> protein to support metabolism and growth <b>OR</b> receiving supplemental nutrition any part of the day.	<b>2. Poor</b> Diet for age providing <b>inadequate</b> calories <b>and</b> protein to support metabolism and growth.	
<b>Tissue Perfusion &amp; Oxygenation</b>	<b>0. Adequate</b> Normotensive for age, & oxygen saturation $\geq 95\%$ , & normal hemoglobin, & capillary refill $\leq 2$ seconds.	<b>1. Potential Problem</b> Normotensive for age <b>with</b> oxygen saturation $<95\%$ , <b>OR</b> hemoglobin $<10$ g/dl, <b>OR</b> capillary refill $> 2$ seconds.	<b>2. Compromised</b> Hypotensive for age <b>OR</b> hemodynamically unstable with position changes.	
Medical Devices				
<b>Number of Medical Devices</b>	<b>Score 1 point for each medical device* up to 8 (Score 8 points maximum)</b> *Any diagnostic or therapeutic device that is currently attached to or traverses the patient's skin or mucous membrane.			
<b>Repositionability/Skin Protection</b>	<b>0. No Medical Devices</b>	<b>1. Potential Problem</b> All medical devices can be repositioned <b>OR</b> the skin under each device is protected.	<b>2. Problem</b> Any one or more medical device(s) <b>cannot</b> be repositioned <b>OR</b> the skin under each device is not protected.	
			<b>Total</b> (≥ 13 considered at risk)	

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**Table 1.** A Comparison of the Braden Q Scale and the Braden QD Scale<sup>1,7</sup>

Variable	Braden Q Scale	Braden QD Scale
Population tested	Pediatric ICU patients ages 3 weeks to 8 years, excluding patients with congenital heart disease	Hospitalized patients, ages preterm to 21 years, on bed rest for at least 24 hours from hospital admission, with a medical device attached to or traversing skin or mucous membrane
Risk assessed	Immobility-related pressure injuries	Immobility-related and medical device–related pressure injuries
Subscales	7 <ul style="list-style-type: none"> <li>• Mobility</li> <li>• Activity</li> <li>• Sensory perception</li> <li>• Moisture</li> <li>• Friction and shear</li> <li>• Nutrition</li> <li>• Tissue perfusion and oxygenation</li> </ul>	7 <ul style="list-style-type: none"> <li>• Mobility</li> <li>• Sensory perception</li> <li>• Friction and shear</li> <li>• Nutrition</li> <li>• Tissue perfusion and oxygenation</li> <li>• Number of medical devices</li> <li>• Repositionability/skin protection</li> </ul>
Subscale levels	4	3
Scoring range	1 to 4	0 to 2, plus up to 8 medical devices
Risk	At risk: scores ≤ 16 Low numbers = higher risk	At risk: scores ≥ 13 High numbers = higher risk

- A child capable of making slight position changes but needs assistance to fully turn. **Score: 1**
- A child with spastic quadriplegia receiving non-invasive positive-pressure ventilation. **Score: 2**
- An infant receiving neuromuscular blockade. **Score: 2**

**Sensory perception.** Evaluate level of responsiveness using progressive stimuli, such as voice followed by touch and then if necessary a noxious stimulus. Use the State Behavioral Scale (SBS)<sup>8</sup> to assess level of sedation and the Glasgow Coma Scale to assess level of consciousness. Assess potential sensory deficits by evaluating the patient’s response to touch over dependent body surfaces and review the patient’s medical record for a history of decreased motor response to sensory stimuli. Both local sensory responses and cognitive perception are considered when scoring. If the patient has a scoring difference between local sensation and cognitive perception, the most abnormal variable determines the score.<sup>1</sup> In the scenarios below, sensory perception would be scored as follows:

- A five-year-old with a tracheostomy who is unable to speak but fully able to express feelings using nonverbal communication techniques. **Score: 0**
- A two-year-old with pneumonia who can communicate pain and discomfort in a developmentally appropriate manner. **Score: 0**
- A 16-year-old who has undergone orthopedic surgery and has an epidural in place for pain management. **Score: 1**

- A child with spina bifida who is insensate in the lower extremities but can independently reposition and transfer from bed to chair. **Score: 1**
- A mechanically ventilated, sedated child receiving extracorporeal membrane oxygenation who is responsive to sound and touch (SBS: –1). **Score: 1**
- A nonverbal five-year-old with severe cognitive impairment. **Score: 1**
- A child who is heavily sedated (SBS: –2). **Score: 2**
- A child with high cervical injury and lack of sensation in both upper and lower extremities. **Score: 2**

**TOLERANCE OF THE SKIN AND SUPPORTING STRUCTURE**

**Friction and shear.** To assess the risk posed by friction, consider the patient’s ability to move or assist with movement or the caregiver’s ability to lift the patient completely off the bed, without sliding or dragging the patient across the bed. To determine the risk posed by shear, consider the patient’s ability to maintain a position in the bed or chair without sliding down. In the scenarios below, risk from friction and shear would be scored as follows:

- A chemically paralyzed four-year-old who can be completely lifted and repositioned in bed. **Score: 0**
- A school-age postoperative patient who can sit in a chair without sliding. **Score: 0**
- An adolescent who requires assistance repositioning in bed and experiences some friction and shear when lifting self in bed. **Score: 1**

- A child with a head injury who is unable to maintain proper body alignment and requires occasional repositioning because of sliding down in bed. **Score: 1**
- A 15-day-old neonate requiring high-frequency oscillatory ventilation. **Score: 2**
- A 12-year-old with cerebral palsy and spasticity whose elbows are red from being rubbed against the bed. **Score: 2**
- A child in the pediatric ICU who is severely agitated (SBS: +2). **Score: 2**
- A school-age child with open, pruritic, eczematous lesions who can raise herself or himself off the bed independently during repositioning. **Score: 2**

**Nutrition.** For their first six months, infants are typically fed on demand, and receive breast milk or infant formula exclusively. Breastfeeding may continue for a year or longer; nonbreastfed infants should receive infant formula through their first year. Simple solid foods can be introduced at about six months of age. Serving sizes for infants are very small. After nine months, infants should be offered two to three nutritious snacks per day.

Toddlers' diet habits become more like those of adults as they eat more solids and consume liquids other than breast milk or formula. A pattern of solid intake that includes at least three meals per day and healthy snacks progresses and continues through adolescence. For a comprehensive review of patients' nutritional needs from infancy through young adulthood, review the Bright Futures reference tools on the American Academy of Pediatrics website (<http://brightfutures.aap.org>).

at [www.nutritioncare.org/Guidelines\\_and\\_Clinical\\_Resources/Clinical\\_Guidelines](http://www.nutritioncare.org/Guidelines_and_Clinical_Resources/Clinical_Guidelines)). In the scenarios below, nutritional risk would be scored as follows:

- A bottle-fed six-month-old whose parents recently introduced cereal and fruit into the diet. **Score: 0**
- A two-month-old breastfed infant who feeds on demand and underwent surgery less than 24 hours ago. **Score: 0**
- A 10-month-old who is unable to take food by mouth but receives parenteral nutrition that provides sufficient calories and protein. **Score: 1**
- A postoperative pediatric patient whose oral intake has been limited for the past four days. **Score: 1**
- An adolescent receiving enteral tube feedings that provide adequate calories and protein. **Score: 1**
- An adolescent who for the past six days has been receiving a liquid diet that provides adequate calories but inadequate protein intake. **Score: 1**
- A child with global developmental delay who receives adequate calories and protein by enteral tube feedings but is malnourished, with a serum albumin level of 2 g/dL. **Score: 2**
- A six-year-old admitted with dehydration and frequent emesis who is unable to take food by mouth and has been receiving IV maintenance fluids for the past three days. **Score: 2**

**Tissue perfusion and oxygenation.** Monitoring tissue perfusion and oxygenation enables clinicians to evaluate the adequacy of oxygen delivery to the tissues. To assess risk associated with poor perfusion and oxygenation, measure the patient's blood pressure, peripheral oxygen saturation level by pulse oximetry (SpO<sub>2</sub>), and capillary refill time. The patient's

**Note that patients who are not receiving a normal oral diet for their age are scored a 1 (limited) on the Braden QD Scale even if their total enteral or parenteral intake provides sufficient calories and protein.**

When assessing nutritional risk, consider all forms of nutrition over the most recent three consecutive days, as well as the caloric and protein needs of the patients' age group. Note that patients who are **NOT receiving a normal oral diet for their age** are scored a 1 (limited) even if their total enteral or parenteral intake provides sufficient calories and protein. Review the patient's medical record for any clinical notes addressing nutritional needs. If no such notes are available, consult with age-based norms derived from clinical practice guidelines, such as those produced by the American Society for Parenteral and Enteral Nutrition (available

risk score is based on these factors, as well as on blood studies and the patient's physiologic response to changes in position. The patient, however, need not demonstrate all of these variables at a particular level. If there is a scoring disparity between oxygenation and tissue perfusion, the most abnormal variable determines the score. In this subscale, hemodynamic, vasopressor, ventilator, and oxygen support interventions are not considered, only the net result on the patient's hemodynamic and oxygenation status.

In the scenarios below, risk of poor tissue perfusion and oxygenation would be scored as follows:

- A normotensive seven-year-old with an SpO<sub>2</sub> reading of 99% and a hemoglobin level of 10.5 g/dL. **Score: 0**
- A normotensive five-year-old who is receiving supplemental oxygen therapy and has an SpO<sub>2</sub> reading of 99%, a normal hemoglobin level, and a capillary refill time of one second. **Score: 0**
- An 18-year-old with an SpO<sub>2</sub> reading of 85%. **Score: 1**
- A 14-year-old with sickle cell anemia and a hemoglobin level of 9 g/dL. **Score: 1**
- A normotensive two-week-old infant who has undergone stage 1 Norwood palliation for hypoplastic left heart syndrome and has an SpO<sub>2</sub> reading of 81% at baseline. **Score: 1**
- A pale, normotensive one-year-old with a single ventricle, a hemoglobin level of 8.6 g/dL, an SpO<sub>2</sub> reading of 80%, and a capillary refill time longer than two seconds. **Score: 1**
- A normotensive three-month-old who has undergone surgery for a congenital heart defect, is receiving multiple vasoactive medications, and has a capillary refill time of more than two seconds. **Score: 1**
- A one-month-old who has undergone heart surgery, is receiving multiple vasoactive medications, and is hemodynamically intolerant of position changes. **Score: 2**
- A 17-year-old with chronic pancreatitis and the following devices: a subclavian central line, peripheral IV line, tracheostomy tube, tracheostomy ties, gastrostomy tube, SpO<sub>2</sub> sensor, urinary catheter, ileostomy pouch, and EEG leads. **Score: 8**  
**Repositionability/skin protection.** The repositionability of devices refers to whether devices can be *routinely* moved or rotated, while skin protection denotes whether the tissue beneath or surrounding the device is protected (with a barrier separating the skin and the device, for example). Of course, it's not always possible to reposition a device or protect the skin. Whether such precautions can be taken depends in part on the patient's age, clinical status, and body habitus; the types of devices used; and the safety of repositioning a specific device in a particular patient. For example, a large nasogastric tube in a small naris may be impossible to reposition, while a small nasogastric tube in a large naris may be easily repositioned. By the same token, a nurse may be able to protect the skin under a device in one patient but not in another.  
Typically, indwelling tubes and drains, such as tracheostomy tubes, procedurally placed drains, and arterial catheters, cannot be repositioned, though it's generally possible to reposition such securement devices as tracheostomy tube ties and tube stabilizers. Noninvasive respiratory devices may or may not be repositioned, and while it's not possible to reposition

**The repositionability of devices refers to whether devices can be routinely moved or rotated, while skin protection denotes whether the tissue beneath or surrounding the device is protected.**

### **MEDICAL DEVICES**

**Number of medical devices.** When counting medical devices, do not include any hospital identification or other bracelets, personal nonmedical devices, taped dressings, or wound and orifice packings. A device with multiple leads, such as an electroencephalographic (EEG) or electrocardiographic (ECG) monitor, is counted as one device. The maximum number of devices is eight, because the predictive value of this subscale does not improve when more than eight devices are counted.<sup>1</sup>

In the scenarios below, pressure injury risk posed by the number of medical devices would be scored as follows:

- An 18-month-old who has undergone a liver transplant and has in place a peripherally inserted central catheter, nasojunal tube, gastrostomy tube, SpO<sub>2</sub> sensor, bilevel positive airway pressure (BiPAP) interface, ECG leads, and EEG leads. **Score: 7**

tion casts, it generally is possible to reposition sequential compression boots, some types of splints, and restraint devices. In the scenarios below, pressure injury risk posed by medical devices would be scored as follows:

- A 15-month-old with both an SpO<sub>2</sub> sensor and ECG leads that can be repositioned. **Score: 1**
- A neonate with a nasogastric tube and adequate skin protection in place. **Score: 1**
- A six-year-old who has a tracheostomy and healthy peristomal tissue with no apparent pressure injury; skin protection around the stoma and beneath the tracheostomy tube wings; and adequate space between the tracheostomy ties and the neck. **Score: 1**
- A four-year-old with a BiPAP interface and adequate skin protection over the nasal bridge. **Score: 1**
- A 14-year-old with a low-profile gastrostomy feeding tube, beneath which is a healing pressure

## Braden QD Scale Scoring Practice

Sharpen your ability to assess pressure injury risk by assigning scores to the patients in these scenarios.

### Scenario 1: An 18-day-old with hypoplastic left heart syndrome

In the neonatal ICU, an 18-day-old infant with a gestational age of 38 weeks has hypoplastic left heart syndrome. He is two weeks post-Norwood procedure with delayed sternal closure and midsternal incisional dehiscence. Following surgery, he had a seizure and a small intracranial bleed. Physical assessment reveals the following:

- Temperature, 36.8°C
- Heart rate, 144 beats per minute
- Respiratory rate, 44 breaths per minute
- Blood pressure, 54/33 mmHg
- Mean arterial pressure, 36 mmHg
- SpO<sub>2</sub> reading, 81%
- Capillary refill time, 4 seconds

Vasopressor and sedative therapy were discontinued. Hemoglobin is 16.4 g/dL and albumin is 3.3 g/dL. The infant is receiving enteral tube feedings that provide adequate calories and is being weaned from lipids. The following devices are in place: a nasogastric tube in his right nare, a sensor measuring oxygen saturation by pulse oximetry (SpO<sub>2</sub>) on his right foot, a right lower-extremity peripherally inserted central catheter (PICC) with hub padded, a negative pressure wound dressing, and electrocardiographic (ECG) leads. The infant can be held by his mother.

### Scenario 2: A 17-year-old with quadriplegia

A 17-year-old with quadriplegia following a gunshot wound to the neck requires full assistance with activities of daily living. He is awake and requires ventilatory support through a tracheostomy. He is on bed rest with a specialty support surface. Physical assessment reveals the following:

- Temperature, 36.6°C
- Heart rate, 90 beats per minute
- Respiratory rate, 17 breaths per minute
- Blood pressure, 90/60 mmHg
- SpO<sub>2</sub> reading, 99%
- Capillary refill time, 2 seconds

The patient has not had vasopressor therapy for five days. Hemoglobin is 9.9 g/dL and albumin is 3.4 g/dL. Feedings that provide adequate calories and protein are being administered through a gastrostomy tube secured with a feeding tube attachment device. A negative pressure wound dressing has been applied to a stage 4 pressure injury on his coccyx. He has bilateral sequential compression devices, foot splints, and ECG leads, an SpO<sub>2</sub> sensor, and a tracheostomy tube with flange padded that is secured with tracheostomy ties.

### Scenario 3: An 18-year-old with Crohn's disease

An 18-year-old with Crohn's disease, severe perianal disease with fistulas, and chronic granulomatous disease had a colectomy seven years ago. Three years ago, the patient required an ileostomy because of bleeding from a colostomy performed at the same time as the colectomy. Vital signs and perfusion are normal for this patient. Hemoglobin is 12.2 g/dL. The patient is dependent on total parenteral nutrition, eating only occasionally by mouth. She appears thin and weak but is able to get out of bed and walk short distances. She has a central iv line with no padding, a right-hand peripheral iv catheter with hub padding, an ileostomy appliance, and an ostomy belt.

### Scenario 4: A seven-year-old with a closed displaced femoral fracture

A previously healthy seven-year-old has a closed displaced femoral fracture. He underwent an open reduction and internal fixation procedure the previous day. His vital signs are normal. He has an SpO<sub>2</sub> reading of 100% and his capillary refill time is two seconds. He is receiving oxycodone for pain and iv antibiotics. A hemoglobin level was not included in the morning laboratory studies. Since his surgery, he has progressed from taking nothing by mouth to drinking clear fluids to eating a soft diet. He is allowed out of bed with assistance from physical therapists. He has an SpO<sub>2</sub> sensor, a knee immobilizer, and a peripheral iv catheter with hub padded in place.

**Scenario 5: An eight-month-old with pulmonary hypertension and chronic lung disease**

An eight-month-old has pulmonary hypertension, chronic lung disease, and tracheal anomalies. She is listed for a lung transplant. Physical assessment reveals the following:

- Temperature, 38.6°C
- Heart rate, 166 beats per minute
- Respiratory rate, 37 breaths per minute
- Blood pressure, 54/46 mmHg
- Mean arterial pressure, 51 mmHg
- SpO<sub>2</sub> reading, 95%
- Capillary refill time, 4 seconds

She is being weaned from methadone. Hemoglobin is 14.2 g/dL and albumin is 5.2 g/dL. She is receiving enteral tube feedings providing adequate calories and protein. She can be out of bed and held by a parent or placed in an infant seat. She does not roll over independently. Her devices include a gastrostomy tube, a peripheral iv catheter with hub padded, an SpO<sub>2</sub> sensor, ECG leads, and a nasal cannula.

**Answer Key**

Subscale	Scores				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Mobility	1	2	0	1	1
Sensory perception	0	2	0	0	0
Friction and shear	0	2	0	1	0
Nutrition	1	1	1	1	1
Tissue perfusion and oxygenation	1	1	0	0	1
Number of medical devices	5 <sup>a</sup>	8 <sup>b</sup>	4 <sup>c</sup>	3 <sup>d</sup>	5 <sup>e</sup>
Repositionability/skin protection	1	1	2	1	1
<b>Total Score</b>	<b>9</b>	<b>17</b>	<b>7</b>	<b>7</b>	<b>9</b>

<sup>a</sup>Nasogastric tube, SpO<sub>2</sub> sensor, PICC, negative pressure wound dressing, ECG leads.

<sup>b</sup>Gastrostomy tube, feeding tube attachment device, negative pressure wound dressing, bilateral sequential compression devices (count as 1), foot splints (1 for each), ECG leads (1 for all), SpO<sub>2</sub> sensor, tracheostomy tube, tracheostomy ties.

<sup>c</sup>Central iv line, peripheral iv catheter, ileostomy appliance, ostomy belt.

<sup>d</sup>SpO<sub>2</sub> sensor, knee immobilizer, peripheral iv catheter.

<sup>e</sup>Gastrostomy tube, peripheral iv catheter, SpO<sub>2</sub> sensor, ECG leads, nasal cannula.

injury that is now protected with a barrier product. **Score: 1**

- A nasally intubated neonate with a reddened naris and no skin protection in place. **Score: 2**
- An eight-month-old with a peripheral iv line and no barrier protection beneath the hub. **Score: 2**
- An orally intubated adolescent whose tube cannot be repositioned. **Score: 2**
- A toddler with EEG leads in place. **Score: 2**
- A three-year-old in Buck's traction. **Score: 2**
- A 10-year-old with an indwelling urinary catheter. **Score: 2**

**INTEGRATING THE COMPONENTS**

After patients are scored on each of the seven subscales, the subscale scores are totaled. Total scores of 13 or higher indicate risk of hospital-acquired

pressure injury and the need for caregivers to take preventive measures. Patients should be assessed for risk within 24 hours of hospital admission, and assessment should be repeated if changes occur in the patient's condition. Interventions should target the areas in which patient subscale scores were 1 or higher.<sup>1</sup>

**Consider the following patient scenario**, which illustrates how the Braden QD Scale assessment components would be integrated in determining the risk of hospital-acquired pressure injury faced by an eight-month-old infant with a history of pulmonary hypertension, chronic lung disease, and tracheal anomalies, who is admitted for a lung transplant. Physical assessment and laboratory studies reveal the following:

- Temperature, 38.6°C
- Heart rate, 166 beats per minute
- Respiratory rate, 37 breaths per minute

- Blood pressure, 78/40 mmHg
- Mean arterial pressure, 53 mmHg
- SpO<sub>2</sub> reading, 95%
- Capillary refill time, 4 seconds
- Albumin level, 5.2 g/dL
- Hemoglobin level, 14.2 g/dL

The infant is being weaned from methadone, receiving enteral feedings by gastrostomy tube that provide adequate calories and protein, not yet rolling over independently, and may be out of bed while being held or reclining in an infant seat. The following medical devices are in place: a gastrostomy tube and a peripheral IV line, both positioned with protective barriers; and a nasal cannula, ECG leads, and an SpO<sub>2</sub> sensor, all of which can be repositioned. The infant's Braden QD Scale subscores would be as follows:

- Mobility: **1**
- Sensory perception: **0**
- Friction and shear: **0**
- Nutrition: **1**
- Tissue perfusion and oxygenation: **1**
- Number of medical devices: **5**
- Repositionability/skin protection: **1**

**Total score: 9**

### STRATEGIC IMPLEMENTATION

Since its development in 1996, the Braden Q Scale has been used internationally to predict the risk of immobility-related pressure injury in hospitalized pediatric patients. With the explosion of technology in the hospital setting and the associated rise in medical device-related pressure injuries, it is no longer sufficient to limit pressure injury risk prediction to immobility. The Braden QD Scale was developed to facilitate the identification of both immobility and medical device-related pressure injury.

Implementing the Braden QD Scale as part of a comprehensive pressure injury prevention program promotes both patient safety and quality of care. Implementation, however, requires a system-level strategic plan that includes system supports, policy changes, a comprehensive staff education plan, and ongoing quality monitoring. System supports would include Braden QD Scale accessibility and ease of use for bedside nurses. To ensure ease of use, we recommend that the Braden QD Scale be built into the electronic health record, alongside other integumentary documentation, such as preventive plans of care, specialty surface use, repositioning every two hours as appropriate, and wound staging. A comprehensive education plan should include scoring of clinical scenarios, ideally presented by simulation or video to enhance interrater reliability (see *Braden QD Scale Scoring Practice*). Consider organizing interdisciplinary teams that include certified wound, ostomy, continence nurses, advanced practice RNs, dietitians, and physical therapists to collaborate routinely with bedside nurses. Once an education plan is in place,

a strategy for ongoing quality data monitoring should be put into practice to ensure consistency in scoring.

The Braden QD Scale is an important strategy for ensuring patient safety during hospitalization and presents an opportunity to measure a nurse-sensitive, patient-centered outcome. Use of the Braden QD Scale may encourage a shift away from reactive reporting of pressure injuries to the proactive reporting of harm prevention. Tracking pressure injury-free days (days at-risk patients do not develop pressure injuries) calls attention to the ways in which nursing care protects patients from pressure injury through early, reliable assessment and consistent execution of preventive measures. ▼

For seven additional continuing nursing education activities on pressure injury, go to [www.nursingcenter.com/ce](http://www.nursingcenter.com/ce).

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### REFERENCES

1. Curley MAQ, et al. Predicting pressure injury risk in pediatric patients: the Braden QD Scale. *J Pediatr* 2018;192:189-95, 195.e1-195.e2.
2. Murray JS, et al. Medical device-related hospital-acquired pressure ulcers in children: an integrative review. *J Pediatr Nurs* 2013;28(6):585-95.
3. Baharestani MM, Ratliff CR. Pressure ulcers in neonates and children: an NPUAP white paper. *Adv Skin Wound Care* 2007;20(4):208-20.
4. Bergstrom N, et al. The Braden Scale for predicting pressure sore risk. *Nurs Res* 1987;36(4):205-10.
5. Braden B, Bergstrom N. A conceptual schema for the study of the etiology of pressure sores. *Rehabil Nurs* 1987;12(1): 8-12.
6. Quigley SM, Curley MA. Skin integrity in the pediatric population: preventing and managing pressure ulcers. *J Soc Pediatr Nurs* 1996;1(1):7-18.
7. Curley MA, et al. Predicting pressure ulcer risk in pediatric patients: the Braden Q Scale. *Nurs Res* 2003;52(1):22-33.
8. Curley MA, et al. State Behavioral Scale: a sedation assessment instrument for infants and young children supported on mechanical ventilation. *Pediatr Crit Care Med* 2006; 7(2):107-14.