PRACTICE APPLICATIONS
Topics of Professional Interest

The Effectiveness of the Braden Scale as a Tool for Identifying Nutrition Risk

PRESSURE INJURIES ARE A global problem affecting approximately 2.5 million patients per year. These pressure injuries can drastically impact the patients' quality of life, with increased pain and infection[1] as well as increased costs to treat. The cost to treat a pressure injury, on average, is $20,900 to $151,700, depending on the severity and extent of the ulcer, and each pressure injury is thought to add approximately $43,180 to the cost of a patient's hospital stay.[2] These injuries also have been linked to increased mortality, with approximately 60,000 yearly patient deaths in the United States from complications of pressure injuries.[2] However, with the correct identification of risk and prompt intervention, they are most often preventable.

Pressure injuries are localized injuries that occur to the skin from unrelieved pressure, decreasing the blood flow in the capillaries, causing tissue anoxia and cell death. This, in turn, results in tissue damage and possible ulceration.[3] These injuries or ulcerations have had many labels over the years, including terms such as "decubitus," "bedsores," and "pressure ulcers."[4] In April 2016, an international consensus met to review, define, and validate the current pressure ulcer staging system that was developed by the National Pressure Ulcer Advisory Panel in 1986. During that consensus meeting, pressure ulcers were renamed "pressure injuries," and new definitions were developed to address the stages of pressure injuries.[5]

Starting in 2008, the Centers for Medicare and Medicaid Services implemented payment penalties for hospitals with high rates of hospital-acquired conditions,[6] which includes pressure injuries developed during the hospital stay (often referred to as hospital-acquired pressure ulcers). Therefore, hospitals have strong motivation to prevent development of pressure injuries and often are willing to dedicate extra health care resources, such as supplies and labor, to do so. To focus resource allocation, one must determine which patients are at highest risk of developing pressure injuries and, therefore, need the most interventions aimed toward preventing actual development.

Nutrition and hydration play an important role in preserving skin and tissue strength, as well as in supporting repair once pressure injuries have occurred.[7] Weight loss along with inadequate energy and protein intake are the two nutritional factors most closely associated with pressure injury development and slow healing. Problems with eating and unintentional weight loss were found to be associated with a higher risk of pressure ulcer development in long-term care residents,[8] and a German study found poor nutritional intake to be strongly linked to the presence of pressure injuries in both hospitals and nursing homes.[9] As discussed in the white paper published in 2015 by National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Pan Pacific Pressure Injury Alliance, individuals with malnutrition, in combination with multiple comorbidities, are at greater risk of developing pressure injuries.[7] Approximately one-third of patients who develop pressure injuries do so because of issues related to malnutrition.[10] Therefore, patients at risk for both malnutrition and pressure injury development need to be identified for early nutrition assessment and intervention.

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BACKGROUND

Pressure Injury Screening Tools

Multiple tools are available to identify the risk for development of a pressure injury. The Norton Scale, the Braden scale, Waterlow Scale, and the Braden-Q scale are a few of these, with the Braden scale being the most widely used in US hospitals. The Braden scale for Predicting Pressure Sore Risk[11] is an assessment tool that was developed by Barbara Braden in 1987 and tested by several clinicians as a part of a research project. Since that time, this pressure injury prediction tool has been integrated into nursing assessment of pressure injury risk in various health care settings in the United States and around the world. Compared with similar pressure injury risk assessment scales such as the Norton or Waterlow scales, the Braden scale has been found to have the most ideal combination of sensitivity (57.1%), specificity (67.5%), and risk estimation (odds ratio=4.08, 95% CI=2.56-6.48).[12] The Braden scale assesses patients by using six categories, each found to play a role in pressure injury formation: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Each category is scored from 1 to 4 (or 1 to 3 for friction/shear), to yield a maximum cumulative score of 23. In the acute care setting, patients are often assessed by nursing staff on admission and again every set number of hours beyond that (for example, once every 12-hour nursing shift or once per day). Based on a patient's total Braden score, patients are determined to be at mild (score of 15-18), moderate (13-14),

high (10-12), or severe (≤9) risk for developing a pressure injury.

Nutrition is one of the six subscales of the overall Braden scale and is intended to gauge a patient's *usual* food intake pattern by considering how much of their meals they typically consume, their average protein intake, whether they are consuming any nutritional supplements, and whether they are receiving nutrition via enteral or parenteral nutrition.[11] Neither the total Braden scale score nor the nutrition subscale score have been independently validated for use as a tool to predict risk of malnutrition.

Hospital policies and procedures often dictate certain interventions by multidisciplinary care teams to appropriately monitor, prevent, and treat pressure injuries based on the degree of risk predicted by the total Braden scale score. Because malnutrition has been proven to increase pressure injury risk and delay healing,[7-10,13] one of these interventions is often a referral to a registered dietitian nutritionist (RDN) for patients with a low total Braden score or nutrition subscale score. Of note, an informal survey of acute care hospitals in the United States indicated that the cutoff score for the Braden scale scores that trigger a nutrition referral are inconsistent. Some hospitals use the nutrition subscale score in addition to the overall Braden scale score for risk stratification and determination of whether to refer a patient to the RDN[13] (M. Hershey, personal communication at statewide nutrition conference of the Virginia Academy of Nutrition and Dietetics, April 12, 2016).

Regardless of the cutoff value used to initiate an RDN referral for further assessment and nutrition intervention, the total Braden scale score has not been validated to identify patients for whom specialized nutrition assessment and intervention by an RDN is necessary or appropriate. Furthermore, since its development in 1987, of the numerous studies that have been conducted to assess the validity of the Braden scale and its subscales for predicting pressure injury risk, many have concluded that the Braden scale is highly overpredictive of actual pressure injury development.[14-16] In other words, not all patients who are predicted to develop a pressure injury actually develop one. This overprediction could be seen as a major flaw of the Braden scale, weakening its practical utility overall, especially as it relates to nutrition screening and referral to the RDN. As explained in one review,[16] the accurate assessment and identification of patients at risk for developing a pressure injury may lead to appropriate measures to prevent actual injury development. Conversely, perhaps the Braden scale truly did identify people in whom pressure injuries never would have developed and, therefore, resulted "in the implementation of unnecessary and potentially costly preventative interventions."[16]

In addition to the Braden scale score possibly being overpredictive of actual pressure injury development, it is difficult to determine based on existing literature whether individual subscales, including nutrition, are independently predictive of true risk. Four studies analyzed the validity of the subscales in the critical care population,[15,17-19] and none found the nutrition subscale score to be independently predictive of pressure injury development. The weakest subscale of the Braden scale was found to be the nutrition subscale, according to another study conducted on elderly inpatients, because the nutrition subscale did not accurately distinguish which patients were more likely to develop pressure injuries.[20]

One of the limitations of the nutrition subscale is that patients receiving enteral or parenteral nutrition, despite potentially meeting their estimated energy and protein requirements, can score no higher on the Braden scale than a 3, or "adequate." A score of 4 ("excellent") can be achieved only by those patients who are meeting their nutrition needs orally, potentially resulting in an unnecessarily lower nutrition subscale score and, therefore, total Braden scale score. Another important limitation to any of these studies is the potential for the Braden scale to be inaccurate, particularly for the nutrition subscale. Although the other five subscales are scored based on *current* status, nutrition is scored based on *usual* dietary patterns, which can lead to confusion and inaccuracies when scoring.[13] This can lead to inaccuracy in scoring the Braden scale, because many nurses score this subscale using the current intake due to lack of knowledge of how the subscale is designed; in addition, some hospitalized patients cannot communicate adequately and, therefore, cannot provide information about usual dietary patterns. The current literature does not describe how much the nutrition subscale score changes over time during a patient's hospital course or to what degree it influences the overall Braden scale score.

Malnutrition Screening Tools

Because nutrition status can influence skin integrity and wound healing, malnutrition should be prevented or treated whenever possible for all patients. In the context of this article, this fact is particularly true for patients who also have been identified as being at risk for pressure injury development. Several validated nutrition screening tools exist, and they were evaluated by the Academy of Nutrition and Dietetics in 2009 for validity and reliability as part of their Evidence Analysis Library process.[21] Of the 11 tools evaluated, the Malnutrition Screening Tool (MST) was shown to have both validity and reliability to accurately identify nutrition problems in acute care hospitals, whereas its simplicity has allowed hospitals to easily adopt this tool. This helps to assess nutrition status and predict poor clinical outcomes related to malnutrition, thereby identifying those patients needing a nutrition assessment and intervention by an RDN.[22]

The MST, completed on admission to the hospital, includes questions regarding an adult patient's recent appetite and weight changes, with scores assigned based on the patient's or caregiver's response to the questions. If the patient states that he or she has lost weight recently without trying, then the nurse proceeds to ask how much weight has been lost and assigns points based on the categories shown in Table 1. The patient or caregiver is then asked whether they have been eating poorly because of decreased appetite; if yes, an additional point is assigned. The weight loss and appetite scores are then totaled; if a patient scores 2 or more points on the screening tool, he or she is considered at nutritional risk, and a referral should be sent to the RDN to complete a more in-depth assessment and determine