Review of the Braden Scale in Regard to the Efficacy of Predicting Skin Breakdown Related to Medical Devices

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Abstract

The literature synthesis demonstrates the Braden Skin Assessment Tool potentially does not adequately assess for patient risk of developing pressure injuries. Recommendation to improve assessment includes: improved communication, care planning, quality monitoring, and facilitated documentation. Education on device related pressure injury assessment recommended.

In healthcare settings there are a multitude of device related pressure injuries that often have multiple points of intervention. Pressure injuries, commonly referred to as pressure ulcers or bed sores, are a problem that has been addressed by The Joint Commission (TJC) through the administration of national patient safety goals. These are specifically located in the *'Nursing Care Center'* section (TJC, 2019). National patient safety goals are initiatives agreed upon by TJC that are patient related healthcare issues that every hospital must have incorporated into their quality program.

The purpose of this literature synthesis is to examine the significance of device related pressure injuries and the efficacy of the Braden Scale for Predicting Pressure Ulcer Risk (Braden Scale). This tool is used to determine the presence of risk a patient has for developing a pressure injury. Potential recommendations are proposed include assessment items that can help the nurses better identify this emerging aspect of pressure injury risk and identification.

Pressure Injury Defined

A pressure injury is defined as skin damage to an affected and localized area, usually above a bony prominence, that can result in tissue degradation with or without a device (Berlowitz, 2018). Pressure injuries commonly occur when a bony prominence or surface experiences friction, increased pressure, decreased blood supply and hypoxia resulting in tissue degradation (Berlowitz, 2018). This tissue degradation can occur in a variety of patient situations

e.g. laying for extended times in one position or having an object rub against an adjacent surface for prolonged periods of time (Berlowitz, 2018). Research suggests that pressure injuries may develop within an hour of the original loading of pressure upon the bony prominence (Gefen, 2008).

There are four stages of pressure injuries. However, there are an additional two stages that are labeled unstageable because the wound bed is not visible to the assessor (Gefen, 2008). Pressure injuries are commonly identified at stage one which are the initial stage where tissue injury risk becomes significantly higher. Following the identification of initial tissue injury, a staging methodology is then utilized to identify the severity of the damage. Stage one pressure injury is classified by non-blanchable redness over a bony prominence or surface. Non-blanchable redness is when a person presses upon a reddened area of skin and then skin does not show the typical white appearance expected upon pressure, instead remaining red (Berlowitz, 2018). The skin in a stage one pressure injury is intact and appears to be a reddened area (Berlowitz, 2018). Stage two pressure ulcer is characterized by degradation of the upper dermis, resulting in the loss of tissue. In a second stage pressure injury, the skin is not intact, classifying this stage as a true ulcer versus pressure injury e.g. stage one (Berlowitz, 2018). Stage three pressure injuries are distinguished by the presentation of full thickness degradation of skin and the degradation of tissue continues into the fat below the skin (Berlowitz, 2018). Stage four pressure injuries are an injury that presents full tissue and skin loss and exposes bone, ligaments, muscle, or the patient's tendon (Berlowitz, 2018).

The two types of unstageable pressure injuries are deep tissue injuries (DTI) and unstageable pressure injuries. Deep tissues injury is where the skin versus intact but appears to have deep discoloration, commonly maroon or purple colored. The wound bed must be

visualized for correct staging and intact maroon skin covering the wound prevents this (Berlowitz, 2018). An unstageable pressure injury is where the skin is broken open; however, there is too much slough, eschar, and dead tissue to truly determine the depth and severity of the pressure injury. In this situation, wound debridement is typically needed to truly visualize the severity of the pressure injury (Berlowitz, 2018).

Device Related Pressure Injury

The prevalence of tubes and devices that are commonly used today in the intensive care unit (ICU) have led the need to better assess pressure injuries that do not adhere to conventional assessment techniques. Bony prominences or unyielding surfaces that have caused pressure injuries and now it is found that one third of pressure injuries are device related pressure injuries (Bronk, 2018). Medical devices that are unyielding e.g. hard plastic or metal, such as medical devices like intravenous (IV) connection ports and clamps, are currently implicated as a cause of pressure injuries. These essential medical devices apply pressure on the skin and act instead of a bony prominence or surface. There are a multitude of ways that pressure injuries that can develop including devices that are positioned incorrectly, kept placed for too long without readjustments, or a lack of padding to help prevent pressure injuries. An example of a device related pressure injury is an injury caused by a continuous positive airway pressure (CPAP) mask. This mask goes over the bridge over the nose and if used for a prolonged period of time, the mask can cause tissue degradation where it is resting on the bridge of the nose (Rathore, Ahmad, & Zahoor, 2016).

The Joint Commission maintains a list of contributing factors that further expands upon the further list that lead to device related pressure injuries. This list includes, but is not limited to, oxygen supplementation devices, feeding tubes, orthopedic devices, wound vacuums,

intravenous catheters, physical restraints, Foley catheters, bed pans, casts and splints, abdominal binders, and medical bands (The Joint Commission, 2018). According to the National Pressure Injury and Advisory Panel (NPUAP), approximately between 30 to 71% of pressure injuries are caused by medical devices (Agency for Healthcare Research and Quality, 2014). In critical care settings, the scope of medical related devices typically needed to support a patient appears to multiply. Devices left in the same position on the skin can cause any stage of pressure ulcer leading to hypoxia causing tissue degradation. In critically ill patients, the risk of pressure injuries is compounded related to illness severity (Qaseem, Mir, Starkey, & Denberg, 2015). The patient placed in acute care may not be as inclined to develop a pressure injury from these devices, but a patient in the intensive care unit with septic shock whose body is placed under more physiological stressors may not be able to prevent the pressure injury (Qaseem et al., 2015).

Patients at risk of a device related pressure injury may additionally include those with paralysis, neuropathy, presence of language barriers, those who are unconscious or in a nonverbal state (Agency for Healthcare Research and Quality, 2014). Additional factors that place patients at risk of developing pressure injuries are older age, medical comorbidities (e.g. type II diabetes mellitus and obesity), malnutrition, and microvascular disorders (e.g. sepsis) (Qaseem et al., 2015).

Cost and Significance

Pressure injuries are a serious medical issue that are financially significant. According to TJC, over 30 % of the pressure injuries that are hospital acquired are related to medical device use (Bronk, 2018). On average in the United State, insurance companies, hospitals, and medical services pay 9.1 to 11.6 billion dollars yearly to treat pressure injuries (Agency for Healthcare

Research and Quality, 2014). Depending on the severity of the pressure injury, the cost of a single pressure injury can cost 20,900 to 151,700 dollars to treat (Agency for Healthcare Research and Quality, 2014). This is an added, intangible burden on the patient related to the pain, suffering, and financial losses directly or indirectly related to the pressure injury. The financial burden placed on hospitals as hospital acquired pressure injuries (HAPIs) are not reimbursed by Centers for Medicare and Medicaid Services (CMS) (Agency for Healthcare Research and Quality, 2017).

According to the Centers for Medicare and Medicaid, hospital acquired pressure injuries (HAPIs) are not covered by Medicare or Medicaid (Agency for Healthcare Research and Quality, 2017). The government places the responsibility of HAPIs on the facility where the pressure injury (Holden-Mount & Sieggreen, 2015). Hospitals are required to do a full body skin assessment within twenty-four hours of admission to make a note of all skin breakages and marks including pressure injuries to determine if the skin damage occurred before admission or during the patient's stay. According to Collaborative Alliance for Nursing Outcomes (CALNOC) a HAPI costs the hospital anywhere from 2,000 to 22,000 dollars (Collaborative Alliance for Nursing Outcomes, 2013).

Pressure Injuries are considered a nursing-sensitive quality indicator and are directly correlated with nursing care in any facility (National Database of NQI, 2010). This represents a significant issue and provides adequate incentive to make changes to assessment of the patients and the devices used to reduce the financial impact to healthcare systems.

The Braden Scale

The Braden Scale is a well known pressure injury risk assessment tool (refer to Appendix A) (Braden & Bergstrom, 1988). The Braden Scale has six elements that evaluates different risk

elements: sensory perception, moisture, activity, mobility, nutrition, and friction & sheer (Braden & Bergstrom, 1988). All of these different elements received a score from one to four, lowest to highest, with four being the highest number you can receive and one being the lowest, with the exception of Friction & Sheer, which is only scaled from one to three. The numerical system of rating the elements is not to be confused with the Braden scale rating pressure injuries. The following is a comprehensive discussion of each risk element.

Sensory Perception

Sensory perception relates to the patient's ability to respond to pain and pressure related stimulus. When scoring sensory perception, a score of one indicates that the patient is completely unresponsive to painful stimulus. A score of two indicates that the patient is only able to respond to painful stimuli (Braden & Bergstrom, 1988). A score of three indicates that the patient understands verbal commands and can follow directions but does not mean that the patient will always respond to these commands verbally. Lastly, a score of four which is a patient that is cognizant of pain and pressure stimulus (Braden & Bergstrom, 1988).

Moisture

Moisture assesses the dryness versus dampness of the patient's skin at the time of assessment. A patient may become moist from a multitude of reasons including sweat, incontinence, or having water come in contact with the skin may lead to the evaluation of the patient's moisture status (Braden & Bergstrom, 1988). A score of one indicates that the patient is consistently wet or moist. A score of two indicates that the patient often moist, but not always moist. A score of three shows that the skin is occasionally moist, but more consistently dry. Lastly, a score of four means that the patient is almost always dry (Braden & Bergstrom, 1988).

Activity

Activity relates to the amount of physical activity that a patient engages in. A score of one means that a patient is completely bed bound (Braden & Bergstrom, 1988). A score of two indicates that the patient is chair bound meaning that their ability to walk is severely limited. A score of three indicates that the patient can walk occasionally meaning that they can walk for short periods of time or with assistive devices. Lastly, a score of four means that a patient is walking around frequently (Braden & Bergstrom, 1988).

Patient Mobility

Mobility is the ability of the patient to move and re-position themselves. A mobility score of one means that the patient is completely reliant on others to move and position themselves. A mobility of two indicates the patient can make small, but infrequent movements. A mobility score of three indicates that the patient is able to make small, but frequent movements. Lastly, a score of four means that the patient is able to make adjustments on their own (Braden & Bergstrom, 1988).

Patient Nutrition

Nutrition assesses the food intake of a patient and whether it's 'very poor', which is a score of one and the patient is either not eating or eating very little of their meals. A score of two means that the patient eats less than a third of their meal or receives less than optimum of their tube feeding. A score of three indicates that the patient is eating half of their meal or on a tube feeding regimen. A score of four indicates that the patient is eating all of their meals consistently and usually eats four meals a day (Braden & Bergstrom, 1988).

Friction & Sheer

The last factor, friction and sheer, is related to ability of the patient moving themselves in bed or in a chair. When the patient is able to slide down and are unable to push themselves back

up, they received a score of one. When then slide down and are able to push themselves back up, but not without dragging their body, they receive a score of two. When the patient can pick themselves back up in bed and move themselves back up, they received a score of three (Braden & Bergstrom, 1988).

Results & Recommendations

The Braden Scale covers multiple areas of risk assessment for skin breakdown including the patient's sensory perception, moisture, activity, mobility, nutrition, and friction & sheer. After an appraisal of the different risk factors entailed in this pressure injury risk assessment scale, it appears that the scale does not account for the number of medical related devices that are in use for the care of a patient. Though the Braden scale assess the patient's physiological risks, the Braden scale does not account for external factors including medical related devices that cause pressure injuries. Accurate use of the scale would enable nurses to successfully identify physiological risk factors only.

Following a comprehensive lit review and appraisal of the Braden scale, medical devices have been much more prevalent and have generated pressure injuries. The most common areas that pressure ulcers occur on the upper part of the body are head, neck, face, and ear (Holden-Mount & Sieggreen, 2015). According to the National Pressure Ulcer and Advisory panel, the devices that cause pressure injuries include nasogastric tube, feeding tubes, endotracheal tubes, tracheostomy tubes, tracheostomy collars, tracheostomy straps, oxygen mask, oxygen nasal cannula, IV, PICC line, and central lines (Holden-Mount & Sieggreen, 2015).

In order to decrease the prevalence of device related pressure injuries, there are steps that may need to be implemented to ensure patient safety. The first step may be implemented is improved communication between patients and healthcare professionals leading to better

assessment by healthcare professionals. This can be demonstrated when the nurse does hourly rounding on a patient to be more attentive to patient's needs and provide additional measures to reposition the patient for comfort. Assessment of the patients that are sedated without verbal communication abilities is important to establish patient comfort and prevent further injuries. For baseline assessment, nurses need to do a head-to-toe assessment; however, when a patient is verbal the healthcare team can receive a more comprehensive healthcare report. With nonverbal patients, it is important to assess the patient's baseline according to patient's physical signs and symptoms along with information from their family members or support system and assess the patient's nonverbal communication such as grimacing. This additional communication measures can aid in patient satisfaction and patient outcomes as this can provide the patient additional comfort measures and physiological healing.

The second step that could be implemented is more effective care plans implemented for patients with patients at high risk of developing pressure injuries. Further surveillance and additional pressure injury prevention methods can be implemented by the clinical nurse specialist on the floor. Evidence based care plans may be implemented through a plan that includes a collaborating interdisciplinary team creating a care plan that individually fits the patient medical needs. These care plans need to include plans of action that are properly implement and actively seeks to involve the patient and the patient's support systems (including family and friends) in the plan of care. Though the nurse is directly responsible for the implementation of the plan of care, additional measures can be taken to include the patient and their support system in the healing process for the patient. The additional use of the clinical nurse specialist with the aiding of additional care plan implementation and incorporation of patient and family members can improve patient outcomes and family involvement.

The third proposal would be to have a discussion with nursing informatics to see if additional charting, specifically providing pick lists, can be implemented so that nurses caring for the patient can have a comprehensive list of the number of medical devices that a patient is using. This comprehensive list, including, but not limited to: external fixator devices (such as cervical traction collars and casts), all drainage tubes or feeding tubes (such as NG tubes and gastric lines), all equipment related to oxygenation (nasal cannulas, BiPAPs, CPAPs, and ET tubes), and all intravenous lines such as IJ lines, PICC lines, and standard IV lines. This additional charting, in which a pick list of all medical equipment used in supportive therapies is provided, could serve as a reminder to the nurses to check all of the patient's lines and tubes every shift. Auto-population of a new screen with the picklist should be implemented until the discharge of the patient, which in turn causes the deletion the picklist. A pick list could provide the patient and the nurse with a focused list to analyze the patient list of medical devices and assess additional risk for pressure injuries.

Conclusion

There is a plethora of research in the recognition of pressure injuries caused by traditional, well-recognized means on patients and implementation of interventions to help prevent pressure injuries. However, additional research into the deficits in the traditional tools used to recognize the risk of pressure injuries in patients with multiple medical devices used to support their treatment. Research is needed to assess the complexity of pressure injury risk assessment and provide addendum pressure injury risk assessment. Further recommendations inclusive additional rounding on patients, additional research from clinical nurse specialist for the implementation of more effective care plans, and collaboration with nursing informatics to

aid in the efficiency of assessing the number of medical devices related to a patient that may cause pressure injuries.

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Appendix A

Patient's Name_____ Evaluator's Name_____ Date of Assessment

SENSORY PERCEPTION ability to respond meaning-fully to pressure-related discomfort	**1. Completely Limited** Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.	**2. Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort				
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2 .Very Moist** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist:** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.				
ACTIVITY degree of physical activity	**1. Bedfast** Confined to bed.	**2 . Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	**4. Walks Frequently** Walks outside room at least twice a day and inside room at least once every two hours during waking hours.				
MOBILITY ability to change and control body position	**1. Completely Immobile** Does not make even slight changes in body or extremity position without assistance.	**2 .Very Limited** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. Slightly Limited** Makes frequent though slight changes in body or extremity position independently.	**4. No Limitation** Makes major and frequent changes in position without assistance.				
NUTRITION usual food intake pattern	**1. Very Poor** Never eats a complete meal. Rarely eats more than ⅓ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days	**2. Probably Inadequate** Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake incudes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.	**3. Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs.	**4. Excellent** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
FRICTION & SHEAR	**1. Problem** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.	**2. Potential Problem** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
				Total Score				