

Pressure Ulcer Pain: A Systematic Literature Review and National Pressure Ulcer Advisory Panel White Paper

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Abstract

Pain is an ever-present problem in patients with pressure ulcers. As an advocate for persons with pressure ulcers, the National Pressure Ulcer Advisory Panel (NPUAP) is concerned about pain. To synthesize available pressure ulcer pain literature, a systematic review was performed of English language literature, specific to human research, 1992 to April 2008, using PubMed and the Cumulative Index in Nursing and Allied Health Literature. Fifteen relevant papers were found; they examined pain assessment tools, topical analgesia for pain management, and/or descriptions of persons with pressure ulcer pain. Studies had small sample sizes and included only adults. The literature established that 1) pressure ulcers cause pain; 2) pain assessment was typically found to be self-reported using different versions of the McGill Pain Questionnaire, Faces Rating Scale, or Visual Analog Scale; 3) pain assessment instruments should be appropriate to patient cognitive level and medical challenges; 4) in some cases, topical medications can ease pain and although information on systemic medication is limited, pain medications have been found to negatively affect appetite; and 5) wound treatment is painful, particularly dressing changes. Research gaps include the prevention and treatment of pressure ulcer pain, the impact of pain on nutrition, and pressure ulcer pain considerations for special groups (eg, children, end-of-life patients, and bariatric patients). The NPUAP presents this white paper as the current scientific know-ledge base on the topic. Research regarding the multidimensional aspects of pressure ulcer pain is strongly recommended.

Key Words: pressure ulcers, pain, literature review, evidence

Index: *Ostomy Wound Management* 2009;55(2):16–31

Potential Conflicts of Interest: None

Pain is an ever-present problem in patients with pressure ulcers.¹ As a protective physiologic mechanism, pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage.² Irrespective of a patient's age or health status, pressure ulcer pain needs to be assessed and treated because it has widespread physical and psychosocial implications for the patient, family, and clinician. Zanca et al³ identified 32 grants as part of their examination of pressure ulcer research funding; topics included pressure ulcer assessment, prevention, and treatment; quality of care studies that include pressure ulcers in their outcomes; or foot pressure management in patients with diabetes mellitus. Only one focused on pain. Although pressure ulcer pain is underrepresented among the funded projects, practitioners are asked to base pain assessment and treatment on research evidence. This paper summarizes research findings specific to

pressure ulcer pain in terms of pain assessment tools, medications, wound care, and nutrition.

Pathophysiology of Pressure Ulcer Pain

Pressure ulcer pain may be caused by tissue trauma from sustained loads, inflammation, damaged nerve endings, infection, dressing changes, debridement, operative procedures, and other treatments. The skin has more sensory nerves than any other body organ.⁴ As the pressure ulcer cellular damage expands, chemicals are released that irritate nociceptive nerve terminals. Nociceptive pain is an appropriate physiological response to a painful stimulus and involves acute or chronic inflammation.^{5,6} The ulcer erodes through tissue planes and destroys nerve terminals. As peripheral nerves regenerate, the nociceptive nerve terminals send out immature sprouts of nerve tissue that may be hypersensitive to both noxious and

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non-noxious stimuli. A heightened sensitivity to pain in the wound is *primary* hyperalgesia; a heightened sensitivity to pain in the surrounding skin is *secondary* hyperalgesia.^{5,6} Infection further irritates free nerve endings and may cause pain.⁷ Pain, particularly acute pain, is also a stimulus to the stress response; thus, at the cellular level, hypoxia may develop because of limited painful breathing and peripheral vasoconstriction and impede wound healing.⁸ Pain also may diminish appetite and decrease nutritional status.

Pain threshold and perception. Besides the physical causes and impact of pressure ulcer pain, pain threshold and perception are important considerations. *Pain threshold* is the amount or degree of a noxious stimulus that leads a person to first interpret a sensation as painful. *Pain perception* is the actual awareness of the painful feeling or sensation; it may be acute or chronic. Pressure ulcer pain perception can be intensified by psychosocial factors, grief about the ulcer's cause and presence, and anger and fear in knowing its long-term treatment impact.

To enhance understanding and ultimately treatment of pressure ulcer pain, this paper synthesizes the available relevant pressure ulcer pain literature. The National Pressure Ulcer Advisory Panel (NPUAP) presents this white paper as the current scientific knowledge base on the topic.

Methodology

Literature searches were performed using PubMed, a service of the National Library of Medicine and the National Institutes of Health, and the Cumulative Index in Nursing and Allied Health Literature (CINAHL®) for the years 1992 to 2008. Words/phrases used for the search included *pressure ulcer pain*, *bedsore pain*, and *decubitus ulcer pain*. The search was limited to English language and human research. Fifteen papers were identified — four addressed topical medication treatment and 11 presented varied aspects of pain measurement, pain treatment, and pain experiences. Papers about other types of wound pain and quality of life where pain was one of many variables examined versus the critical variable were not included in this review.

deLaat et al⁹ completed the last published systematic review about pressure ulcer pain describing scientific evidence and making recommendations for practice; their review also included malodor and exudate. Six papers in deLaat's review are included in the current review. Table 1 summarizes the pressure ulcer pain research obtained from this search in terms of author/year, type of study, participants/sample, purpose, protocol, and findings/main outcomes.

Results

Pain assessment scales used in pressure ulcer pain research. The single most reliable indicator of the existence and intensity of pain and any resultant distress is the patient's self-report through the use of established reporting instruments. Three pain rating scales were used in pressure ulcer pain re-

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Key Points

- To enhance understanding and ultimately treatment of pressure ulcer pain, the authors reviewed and synthesized available relevant pressure ulcer pain literature.
- Even though the vast majority of pressure ulcer patients report pain, research on the topic is limited; gaps in the current knowledge base are identified.
- Recommendations for practice include recognizing that all pressure ulcers — especially treatments — are painful, using a valid tool to assess pain levels, and providing strategies to relieve the pain.

search: the McGill Pain Questionnaire (MPQ), the Faces Rating Scale (FRS), and the Visual Analog Scale (VAS).

Szor and Bourguignon¹⁰ used the MPQ because its description of pain qualities and measure of pain intensity provided a quantitative measure of pain. The MPQ contains the Pain Rating Index scale score and Present Pain Intensity scale score. The most frequently used descriptors by pressure ulcer stage were: tender, hurting, sore (Stage II); burning, tender, hurting, sharp, sore, wretched (Stage III); and tender, hurting, smarting, penetrating, and throbbing (Stage IV). Although persons with Stage IV pressure ulcers had higher Pain Rating Index and Present Pain Intensity scores, they did not differ significantly from ratings by persons with Stage II or Stage III pressure ulcers. Roth et al¹¹ used the MPQ and a singular pain intensity rating. No differences were found in pain ratings for Stage III and Stage IV pressure ulcers. Persons with either Stage III or Stage IV pressure ulcers had significantly ($P < 0.05$) more severe pain (ie, MPQ total and sensory and affective subscales) than persons with other wounds.

In Brazil, Quirino et al¹² used a short version of the MPQ. Key descriptors used by persons with Stages I and Stage II pressure ulcers included throbbing, sharp, burning, aching, and tugging. No study provided reliability or validity data about use of the MPQ for pressure ulcer pain.

Dallam et al¹³ used the FRS and the VAS. They found the VAS correlated with the FRS ($r = .92$) and the VAS correlated with pressure ulcer stage ($r = .37$). The intensity of pressure ulcer pain correlated with generalized pain ($r = .59$). Using data from the Dallam study,¹³ Freeman et al¹⁴ reported statistical properties of the VAS and FRS for pressure ulcer pain. VAS variability significantly increased ($P < 0.01$) with increasing FRS values. VAS and FRS were highly reliable for pain assessment in persons with diminished verbal and abstract thinking abilities and participants did not find them difficult to use. Freeman et al¹⁴ presented a mathematical translation of the FRS findings into VAS units. The VAS has since been used in studies about pressure ulcer pain and medication use (information to follow).^{15,16}

Table 1: Research about Pressure Ulcer Pain in Ascending Order of Publication

| Author (Year) | Type of Study/Method | Participants/Sample Size | Purpose | Protocol | Findings/Main Outcomes |
|---|---|--|---|---|---|
| Jepson (1992) ³¹ | Descriptive (letter to the editor) | N=17 (9 men and 8 women); age 54-91 years. All confined to chair or bed; 13 had advanced cancer. 30 pressure sores, stages 1A to 5 of the UK classification | Examine the effectiveness of aqueous-based cream containing 3% benzylamine for pain due to pressure sores | Applied aqueous-based cream containing 3% benzylamine. Covered with semi-permeable film and taped in place. Patients questioned at 24 (n=17) and 48 hours (n=14) regarding pain relief. Pain assessment scale not presented | At 24 hours, 29 of the 30 ulcers were pain-free. At 48 hours, all were pain free. Benzylamine 3% cream rated effective as a local agent to relieve pressure ulcer pain |
| Dallam et al (1995) ¹³ | Cross-sectional | N=132 patients (54 men and 78 women) in acute care; age 24-100 years (M=71.4, SD=16.4), 44 (33.3%) able to respond to instruments; 88 (66.7%) not able to respond. 48% had a cognitive impairment; 52% were cognitively intact. Ethnic/race included: 66% white, 22% African-American, 11% Hispanic, 2% Asian. 68.9% had a sacral pressure ulcer | Determine the perceived intensity and patterns of pressure ulcer pain in hospitalized patients and identify relations between pressure ulcer pain and depression, mental status, and treatment modalities | Subjects evaluated with the Folstein Mini-Mental State Examination, Beck's Depression Inventory, Faces Pain Rating Scale (FRS), and the Visual Analog Scale (VAS) | 41% denied pressure ulcer pain; 59% had some type of pain. With FRS, 68% had some pain (included patients with cognitive impairments). Only 3 (2%) persons were given analgesics with 4 hours of the interview. VAS correlated with FRS (r=.92). Intensity of pressure ulcer pain correlated with generalized pain intensity (r=.59). Localized VAS correlated with maximum pressure ulcer stage (r=.37). Patients on static air replacement mattresses had significantly less pain than those on other surfaces (P <0.01). Those treated with hydrocolloid dressings had significantly less pain than other topical dressings. No significant difference in pressure ulcer pain ratings between persons who were cognitively impaired and those who were not. Subjects receiving analgesics for pressure ulcer pain reported significantly more pain than those not receiving analgesics; this was also true for tranquilizers |
| Szor and Bourguignon (1999) ¹⁰ | Cross-sectional, comparative; two pain ratings (rest and dressing change) on the same day | N=32 patients in acute, extended, and home care; age 47-95 years, M=74.7, SD=12.8 | To compare pain experienced by patients with Stage II to Stage IV pressure ulcers at rest and during dressing change | Patients rated pain on the McGill Pain Questionnaire | 28 patients had pain at dressing change; 21 rated this pain as mild compared to 5 as excruciating. 27 patients experienced pain at rest; 4 had no pressure ulcer pain. 12 reported pain as continuous during rest and dressing change. Only 2 patients had received medication for the pressure ulcer pain. Pain Rating Index and Present Pain Intensity were not significantly different for stage of ulcer, rest versus dressing change, from rest to dressing change across stages of ulcers |



Table 1: Research about Pressure Ulcer Pain in Ascending Order of Publication (continued)

| Author (Year) | Type of Study/Method | Participants/Sample Size | Purpose | Protocol | Findings/Main Outcomes |
|------------------------------------|--|---|--|---|---|
| Langemo et al (2000) ¹ | Descriptive, qualitative, phenomenological study | N=8; 4 with current pressure ulcer and 4 with previous pressure ulcer. 7 men and 1 woman; age 27–52 years. 4 had spinal cord injury | To explore the lived experience of having a pressure ulcer in order to determine the essential structure of the experience | Participants asked to describe the experience of having a pressure ulcer | 7 themes emerged: perceived etiology of the pressure ulcer; life impact and changes; psycho-spiritual impact; extreme painfulness associated with the pressure ulcer; need for knowledge and understanding; need for and effect of numerous, stressful treatments; and the grieving process. Extreme painfulness associated with a pressure ulcer was described as feeling like being stabbed, getting a knife and digging in there, sitting on needles, burned, stinging. Pain was present the majority of time and area hurt after the ulcer healed. Analgesic use included opioid and non-opioid medications |
| Freeman et al (2001) ¹⁴ | Secondary data analysis of cross-sectional data from Dallam et al 1999 | N=44 (see Dallam et al) | To examine statistical properties of the Faces Rating Scale (FRS) and describe the relationship with the Visual Analogue Scale (VAS) | Comparison of patient ratings from FRS and VAS – nonlinear least-squares regression with a Gauss-Newton iterative procedure | VAS variability significantly increased with increasing FRS values. Between scales, the VAS and FRS were highly reliable for pain assessment in persons with diminished verbal and abstract thinking abilities |
| Fox (2002) ¹⁸ | Descriptive, phenomenological | N=5, 4 men and 1 woman; age 31–64 years; duration of pressure ulcers 4–36 months; participants lived in the community | To explore and describe experiences of patients living with a pressure ulcer | Semi-structured interview | Three main themes with sub-themes emerged from the interviews: physical (pain, exudates, loss of independence), psychological (emotional factors, worry about healing, relationships, body image), and social (social isolation). Pain was a dominant physical factor and recurring theme throughout the interview. Pain varied in level of intensity and disturbed sleep. Deep ulcers were painful |

Gunes¹⁷ used the MPQ and the Faces Rating Scale-Revised (FRS-R) in a study involving 47 persons with Stage II to Stage IV pressure ulcers. He reported a statistically significant relationship between the patient's present pain intensity and the FRS-R ($r = .90$); FRS-R mean pain intensity scores were rated as moderate pain. He also found that MPQ completion time was challenging for some participants and that pain intensity increased with pressure ulcer stage. Only six patients received pain medication within 6 hours before completion of the questionnaire and none of the medications was prescribed specifically for pressure ulcer pain.

Qualitative pressure ulcer pain studies^{1,18-20} were not found to use a specific pain scale — rather, participants were asked to respond to open-ended questions about pain. Langemo et al's study¹ included eight participants who described their pressure ulcer experience; pain emerged as a theme. Fox¹⁸ used a semi-structured interview in which five patients shared individual experiences of living with a pressure ulcer. Pain was the dominant, recurring physical factor theme — an overwhelming aspect of living with a pressure ulcer. Hopkins et al¹⁹ used unstructured interviews with eight persons to probe for themes of living with a pressure ulcer; endless pain was one of three themes. In Rastinehad's study,²⁰ 10 patients described what it was like to have a painful pressure ulcer. Although sample sizes were generally small in qualitative studies, pain was a critical theme.

Because pressure ulcer pain research is limited, it is important



Table 1: Research about Pressure Ulcer Pain in Ascending Order of Publication (continued)

| Author (Year) | Type of Study/Method | Participants/Sample Size | Purpose | Protocol | Findings/Main Outcomes |
|---------------------------------------|---|---|--|---|--|
| Zeppetella et al (2003) ¹⁵ | Randomized, double-blinded, placebo-controlled, crossover pilot study | N=5; 3 men and 2 women; age 62-87 years; hospice inpatients with advanced malignant disease; had painful pressure ulcer, not infected, not covered with necrotic tissue and suitable for once-daily treatment with IntraSite* gel. Patients had stable analgesic regimens. They were able to complete the VAS score | To examine the analgesic effects of morphine applied topically to painful pressure ulcers | Participants were treated for 2 days with morphine (morphine sulfate injection 10 mg/ml in 8 g Intrasite gel) or placebo (water for injection in 1 mL in 8 g Intrasite gel) and covered with a Tegaderm ^a dressing. After 2 days, there was a 2-day washout after which they crossed over to the other treatment. VAS scores were recorded twice daily | All had lower VAS scores with the morphine treatment. Local or systemic adverse events were not attributed to the morphine. Authors concluded morphine applied topically is an effective method of providing local analgesia, well tolerated by patients and not associated with systemic adverse affects |
| Flock (2003) ³² | Randomized, double blind, placebo-controlled crossover trial | N=13 hospice inpatients with cancer; 3 men and 10 women; mean age 76.5 years. Stage II (n=8) or Stage III (n=5) pressure ulcers. 7 patients completed the study | To determine the effectiveness of diamorphine gel to control pressure ulcer pain and compare it to a placebo | 3 days IntraSite ^b gel and 3 days diamorphine gel or vice versa. Applied once daily. All had pressure-relieving cushions and mattresses. Pain was assessed before and 1 hour and 12 hours after the gel application. Pain scoring: 0, no pain; 1, mild; 2, moderate; 3, severe; 4, overwhelming | Pain scores improved significantly ($P < 0.003$ and $P < 0.005$) at 1 and 12 hours, respectively, after diamorphine gel compared to baseline. Intra-Site gel had no effect on pain. Mean pain scores were not given. One patient experience symptoms similar to opioid toxicity, but these were related to her fentanyl patch, not the gel. Although diamorphine gel is probably safe, a larger study is needed |
| Quirino et al (2003) ¹² | Descriptive, cross-sectional | N=20 from 3 Brazilian hospitals; 15 men and 5 women; mean age 57.25±19.32 years. 14 white, 3 black, 3 Asian. 16 had one pressure ulcer. 17 were sacral ulcers. Pressure ulcer stages: 9 Stage I; 8 Stage II; 2 Stage III; and 1 Stage IV Persons with para- or tetraplegia and para- or tetraparesis were excluded | To quantitatively and qualitatively describe pressure ulcer pain | Participants were identified by a nurse, mental status was assessed by the Mental Evaluation Questionnaire, and signed consent obtained. Participants responded to a demographic questionnaire, pain characteristic questions, and the McGill Pain Questionnaire. All questions were asked before topical wound care. NPUAP pressure ulcer staging was used | All experienced pressure ulcer pain. 80% had no typical time pattern to the pain; 55% had pain at rest and 45% had pain with movement. 80% had constant pain. Pain did not impair sleep (55%), appetite (75%), or walking (90%). Common pain descriptors: 35% burning, 25% throbbing, 25% tugging, 20% sharp. Mean pain intensity = 5.80±2.93. Significant associations were found between pain and ethnicity, ethnicity and appetite, time of day and number of ulcers, and age and impaired walking (P value range 0.002 to 0.034). 14 persons took nonsteroidal anti-inflammatory pain medication; 71.4% reported little or no analgesic effect. 13 described repositioning in bed, wet dressings, and massage as pain management strategies with 53.8% reporting satisfactory outcomes |

^a 3M Health Care, St. Paul, MN

^b Smith & Nephew Largo, FL



Table 1: Research about Pressure Ulcer Pain in Ascending Order of Publication (continued)

| Author (Year) | Type of Study/Method | Participants/Sample Size | Purpose | Protocol | Findings/Main Outcomes |
|---|---|---|---|---|---|
| Roth et al (2004) ¹¹ | Cross-sectional, prospective | N=69. All men; mean age 59 years. 39 had Stage III and Stage IV pressure ulcers. 30 had other wounds (eg, Stage II pressure ulcers, postoperative wounds, venous stasis ulcers, or diabetic ulcers) | To compare the utility of the singular pain intensity rating scale (Numerical Pain Rating Scale [NPRS]) and a multidimensional pain questionnaire (McGill Pain Questionnaire [MPQ]). To determine if patients with more severe wounds report more severe pain intensity. To determine if patients with pain display a pattern of psychological disturbance and maladaptive pain coping strategies | Participants were assessed per their wound status by a nurse and physician. Each person was seen a maximum of 6 visits and asked about pain. If wound-related pain was present, participants completed additional questionnaires. Other questionnaires in the study: Brief Symptom Inventory, Center for Epidemiologic Studies Depression Scale and the catastrophizing scale of the Coping Strategies Questionnaire. Each visit was compensated (\$10) | 19 participants had wound pain. A trend for a greater percentage of patients with Stages III and Stage IV pressure ulcers to experience wound pain compared to the other group ($P=.07$). Spinal cord injury status did not affect pain scores. 28% had wound pain unrelated to dressing change. Wound stage was positively related to pain severity. Participants with Stage II/IV ulcers had more severe pain on the MPQ total, sensory, and affective scores than the other group. Pain catastrophizing was related to pain intensity and to higher levels of affective distress and depressive symptoms |
| Prentice (2004) ¹⁶ | Randomized double-blinded placebo-controlled trial | 31 patients entered; 1 withdrew. Age range 38–92 years. 17 were in the benzylamine hydrochloride group and 13 in the placebo group. All were in palliative care and had cancer | To compare pain reduction from topical benzylamine hydrochloride 3% cream to placebo | Each patient completed the 100 mm VAS and an 11-point numerical pain score at 24 hours prior to and immediately before application of the cream and after at 2, 6, 12, and 24 hours | The pain scores did not differ between the two groups |
| Hopkins et al (2006) ¹⁹ [summarized by Bale et al (2007) ³²] | Heideggerian phenomenology. Inclusion criteria: >65 years of age, Grade 3 or 4 pressure ulcer for more than a month, and able to give consent. Exclusion criteria: spinal cord injury | 8 participants (7 from United Kingdom and 1 from Belgium) from 4 centers and multiple data collectors | To explore the experience of older people living with pressure ulcers | Unstructured interviews and use of probing | Three themes were identified: endless pain, restricted life, and coping with the pressure ulcer. Endless pain had 4 subthemes: constant presence, keeping still, equipment pain, and treatment pain |



Table 1: Research about Pressure Ulcer Pain in Ascending Order of Publication (continued)

| Author (Year) | Type of Study/Method | Participants/Sample Size | Purpose | Protocol | Findings/Main Outcomes |
|--------------------------------------|---|---|--|--|--|
| Rastinehad (2006) ²⁰ | Heideggerian hermeneutic phenomenology, qualitative | 10 patients, age 30 to 90 years capable of describing their pain experience. 7 had Stage II pressure ulcers; 2, Stage III; 1, Stage IV. 8 ulcers on sacral region; 1, heel; 1, scapula | To explore the questions, "What is it like to have a painful pressure ulcer?" | Semi-structured interviews during an 8-month period | 22 themes and 1 constitutive pattern emerged. Paper focuses on 2 themes: Pain descriptors and failure of technomedicine to provide care/comfort and the constitutive pattern; pain as existence. Pain terms were categorized as sensory, evaluative, and affective |
| Spilsbury et al (2007) ⁴⁴ | Qualitative semi-structured interviews | 23 hospitalized patients; 5 men and 18 women; ages 33-92 years (median 78 years). Most common pressure ulcer locations: heel and sacrum. Pressure ulcer grades were 2 through 5 | To explore patients' perceptions and experiences of the impact of a pressure ulcer and its treatment on health and quality of life | Data were analyzed for themes | Pain was experienced by 21 persons. Pain ranged from worse to little. Pain could be constant or varied across the day. 8 had pain with dressing change |
| Gunes (2008) ¹⁷ | Descriptive quantitative and qualitative | 47 hospitalized patients; 29 men and 18 women; age 38-72 years (mean 60.1 years). Patients with sensory motor deficiencies were excluded. Pressure ulcers (n=68) included 6 Stage II, 32 Stage III, and 9 Stage IV. The most common locations were sacrum, trochanter, and heel | To describe the quantitative and qualitative characteristics of pain related to pressure ulcers | Instruments included patient demographics, McGill Pain Questionnaire, and Faces Rating Scale-Revised. Data were analyzed with descriptive statistics, Fisher exact test, analysis of variance, and Spearman rank correlation coefficient | Pressure ulcer pain was reported by 94.6% (n=44) of the sample. 13 words were used to describe pressure ulcer pain; the number of words increased as the pressure ulcer stage increased. The most common term was hot-burning. Stage IV pressure ulcers had the highest pain intensity. The Faces mean pain intensity was moderate pain. 32 reported dressing change aggravated the pain |

to consider evaluating pressure ulcer pain assessment options for special populations of patients. Patients with cognitive impairment have been found to respond to pain assessment tools such as the Faces Pain Scale and the Present Pain Intensity subscale of the MPQ.^{21,22} Simple yes/no questions (eg, Are you uncomfortable? Do you feel pain?) are used to assess pain. Family members or caregivers can report expressions/behaviors they recognize as indicators of pain. For critically ill intensive care patients, the Behavioral Pain Scale (BPS) assesses pain in terms of facial expression, upper-limb movement, and ventilator compliance.²³

Pressure ulcers in children need to be considered a source of pain.²⁴ Pain assessment scales used with this population include the 0 to 10 pain rating scale or the FACES.²⁵ The Face, Legs, Activity, Cry, Consolability (FLACC) scale²⁶ is a behavioral pain assessment instrument initially developed for scoring postoperative pain in young children. The FLACC has been found to have high (r = .94) reported inter-rater reliability.²⁷ The revised FLACC scale that includes specific descriptors and identifies unique behaviors for individual children has been found to have intra-class correlation coefficients ranging from 0.76 to 0.90.²⁸ Construct validity was demonstrated by decreasing FLACC scores following analgesic administration.²⁸ For assessment of pain in neonates (ages 0 to 6 months), the Crying; Requires O₂ for Saturation >95%; Increasing vital signs; Expression; Sleepless (CRIES) scale has been used effectively and has a high reported reliability.^{29,30}

Medications for pressure ulcer pain treatment. Researchers have examined the use of topical medications for pressure ulcer pain treatment.^{15,16,31,32} Zepetella's,¹⁵ Prentice et al's,¹⁶ and Flock's³² studies used a randomized double-blind placebo controlled design; in addition, Zepetella's¹⁵ and Flock's³² studies included a crossover component. Jepson's³¹ descriptive study (N = 17) was presented as a letter to the editor.

Zepetella et al¹⁵ used the VAS to examine the analgesic effect of 10 mg of



morphine sulfate injection in 8 g Intrasisite gel (Smith & Nephew) applied topically to painful pressure ulcers compared to water for injection 1 mL in 8 g Intrasisite gel for five patients.¹⁵ Participants continued with their regularly scheduled analgesia. They had lower ($P < 0.01$) VAS scores with the morphine gel treatment (gel alone mean + standard deviation = 47 + 11 versus morphine gel = 15 + 11). Three patients reported localized discomfort with the gel alone but not with the morphine gel. Systemic adverse effects were not noted with the morphine gel.

Flock³² examined the effectiveness of diamorphine gel to control pressure ulcer pain for 13 patients with grade 2 or grade 3 pressure ulcers. Pain scores were rated as none (score 0) to overwhelming (score 4). Among the seven patients who completed the study, pain score significantly improved 1 and 12 hours after the diamorphine gel was applied; this was not true for the gel alone. New symptoms that patients developed during the study (ie, skin irritation, pruritus, nausea/vomiting) were similar for the two treatments. One patient developed symptoms similar to opioid toxicity when her fentanyl patch was increased; her symptoms resolved when the fentanyl dose decreased.

Jepson³¹ reported that a aqueous-based cream containing 3% benzydamine was effective within 24 hours in reducing pressure ulcer pain. The pain scale used in the study was not named. In a study with more controls, Prentice et al¹⁶ used the VAS and an 11-point numerical pain score to examine the effect of topical benzydamine hydrochloride 3% cream as compared to a topical placebo cream on relief of pressure ulcer pain ($N = 30$). VAS and numerical pain scores decreased in both groups. The reduction in pain was greater in the benzydamine group but not significantly different. Comparing the VAS and numerical pain scale scores over time, Prentice¹⁶ noted the R-square values increased (ie, 66.4%, 74.2%, and 94.5%), indicating participants learned how to use the various scoring methods across the study.

The pressure ulcer pain literature included limited descriptive information about the use of systemic analgesics for this pain. Dallam et al¹³ reported three out of 132 participants (2.3%) were given pain medication for pressure ulcer pain within 4 hours of pain measurement. Drugs used by these patients that may have decreased pressure ulcer and other pain included narcotics, nonsteroidal anti-inflammatory drugs (NSAIDs), tranquilizers, psychotropics, and sedatives. Szor and Bourguignon¹⁰ reported seven persons (21.8%) received pain medication within 6 hours before completing the pain study; the medication was prescribed specifically for pressure ulcer pain for only two of these persons. None of the seven participants reported an absence of pain from the medication.

Studies on the use of systemic and/or local analgesics for pressure ulcer pain management in vulnerable patient groups (ie, neonates and children, patients with a history of substance abuse, morbidly obese/bariatric, minority groups, and at end of life) could not be found. This is an important concern. Children as

young as 3 years of age have been found to have painful memories of procedures.³³ Minority groups have been found to be at risk for inadequate pain control.³⁴ Persons who have chronically used opioids have been found to have a decreased tolerance for pain.³⁵ In addition, clinicians may have misconceptions and value judgments about pain treatment in persons who used illicit drugs, especially when the drugs were injected.³⁶

Obese children and adults experience analgesic medication administration issues because excess body fat can alter drug absorption³⁷ — for example, drugs that are highly soluble in fat (eg, diazepam and carbamazepine) need the dose calculated using the patient's actual body weight, but drugs absorbed mainly in lean tissue (eg, acetaminophen) should have the dose calculated using the patient's ideal body weight.³⁷ If an obese patient is to receive pain medication by intramuscular injection, standard intramuscular needle length may not be sufficient to penetrate past the adipose tissue. Although the intravenous route is an option for more consistent administration of pain medication, vein access can be problematic in patients who are obese, as well as in persons who inject illicit drugs.

Langemo³⁸ noted pressure ulcers are a concern for patients receiving palliative care but that little is known about wounds in these patients.³⁸ For patients at the end of life, regular assessment for pain and use of therapies proven effective to manage pain are recommended.^{39,40}

Although research was not found about the impact of systemic analgesics on pressure ulcer pain, systemic analgesics are a critical component in overall pain management and thus need to be considered for chronic pressure ulcer pain. The World Health Organization's (WHO) Analgesic Dosing Ladder⁴¹ frequently is used as a guide for systemic pain medication management. The WHO ladder includes many categories of systemic medications for pain management (eg, NSAIDs, opioids, and adjuvants) and encourages matching the analgesic to the patient's level of pain. Using a 10-point scale where 10 is the highest pain level, recommendations for analgesia include mild opioids for scores 1 to 3, moderate opioids for scores 4 to 6, and strong opioids for scores 7 to 10.⁴² Spontaneous or induced wound pain usually is treated with a supplemental systemic, rapid-acting opioid.⁴³ Breakthrough pain medications should be administered with sufficient time to take effect, such as before a painful pressure ulcer treatment. A pain management specialist may help determine the most appropriate medication protocols to minimize medication side effects and toxicity maximize pain reduction/relief.

Wound care and pressure ulcer pain. Pressure ulcer pain associated with treatment and/or wound care was reported in some studies. Dallam et al¹³ noted patients whose ulcers were treated with hydrocolloid dressings as opposed to management with other topical dressings ($P < 0.02$) had significantly less pain. Szor and Bourguignon¹⁰ reported 87.5% of participants had pain at dressing change. This pain ranged from mild ($n = 21$) to excruciating ($n = 5$). Pain did not differ at rest and at dressing change across the stages of ulcers. Spilsbury et al⁴⁴ reported that eight out

of 23 persons (34.8%) had pain with dressing change. Gunes¹⁷ reported that 32 out of 47 patients (68.1%) stated dressing change aggravated pressure ulcer pain.

Although procedural pain may be addressed in literature regarding specific treatments, information on pressure ulcer pain research conducted during procedures/treatments was not found. Some authors presented findings about wound dressings and pain in general. For example, the Thunder Project II⁴⁵ (N = 6,201) described pain related to procedures commonly performed in critical care settings; one of the painful procedures was wound dressing change. Adolescents gave wound care the highest pain intensity score and adults rated it the third most painful procedure (following turning and wound drain removal).

Choosing dressings that may mitigate the pain associated with dressing changes and administering an analgesic before dressing changes have been found to be possible strategies for pain management.⁴⁶ Pain rated as moderate (eg, 4 on a 1 to 10 scale) should prompt breaks during the dressing change, improved analgesia, and a review of current dressing protocols.⁶ The World Union of Wound Healing Societies,⁶ using a modified Delphi approach, developed a document that lists principles of best practice for minimizing pain at wound dressing-related procedures. These principles include: 1) be aware of current wound pain, 2) avoid unnecessary manipulation of the wound, 3) explore patient-controlled techniques to minimize wound pain, 4) assess the skin and surrounding tissue for infection, necrosis, and the like, 5) consider the temperature of the wound products, 6) avoid excessive pressure to the wound from dressing materials, and 7) provide ongoing evaluation and manipulation of the management plan.

Nutrition and pressure ulcer pain. Specific research related to the impact of pressure ulcer pain on nutrition could not be found. However, Bosley et al⁴⁷ reported chronic pain was associated with self-reported appetite impairment in older adults. The authors identified the need for research on the effect of pain reduction on appetite. Herr et al's⁴⁸ guideline about acute pain management in older adults includes a section about monitoring for nausea that may negatively impact nutrition. Guidelines^{49,50} on palliative care recommend minimizing dietary restrictions, offering small quantities of food at a time, and offering food more frequently throughout the day. Patients should select foods that match their appetite in terms of appearance, consistency, and aroma. The decision to use medications to stimulate appetite should be made on an individual basis. Pain medication in and of itself may affect appetite and taste.

Conclusion

The NPUAP is an advocacy organization that believes that all, or nearly all, pressure ulcers cause pain. The NPUAP also believes it is crucial to increase the scientific knowledge base for pressure ulcer pain and disseminate this knowledge, particularly to the bedside clinician. Healthcare providers report that dressing change and wound treatment are among the most painful times for an individual with a pressure ulcer.

Pain assessment scales are available and have been used in research to measure pressure ulcer pain. Open-ended questions about pain also have identified the presence of pain in persons with pressure ulcers. Clinicians should have a high index of suspicion of pressure ulcer pain in patients including those who cannot respond (eg, patients with dementia, ischemia, and cancer). Irrespective of the pain assessment format used, patients with pressure ulcers need to be asked about their pain, using a structured tool or open-ended questions for assessment. Although pressure ulcer pain research has included Stage I through Stage IV to some degree, information on Stage I and Stage IV is more limited in published studies.

In general, research regarding pressure ulcer pain is limited. However, the results of this review underscore a number of perspicuous points. First, pressure ulcers cause pain. Pressure ulcer pain was identified in both quantitative and qualitative studies. Second, pain levels in individuals with pressure ulcers — including neonates, children,

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adults, and the elderly — must be routinely assessed. Third, a number of pain assessment tools have been used in pressure ulcer pain research and include the MPQ, FRS, and VAS. Pressure ulcer pain assessment tools should match the cognitive level of the patient and be appropriate for special groups, such as persons with compromised mental competence, substance abuse, bariatric concerns, spinal cord injury, and other neurological illness or end-of-life issues that can impair perception and pain reporting. Fourth, some research has noted the positive effects of topical medications for pressure ulcer pain. Research about the impact of systemic medications was not available. Fifth, wound care treatments such as dressing changes can cause pain. Given that dressings and their need for changing may cause pain, it is important to consider dressings based on their comfort and frequency of change. Lastly, pain medication can affect appetite and taste. The effect of pressure ulcer pain on nutritional status must be assessed. Pain medications should be administered on a schedule that maximizes the patient's ability to eat and to be comfortable during pressure ulcer treatment. The goal is to optimize food/fluid intake and decrease the risk of nutritional problems such as weight loss and delayed healing.

Inadequate knowledge of pain is a barrier to its management. Although this review did not examine literature about pressure ulcer pain education, pressure ulcer education needs to include content regarding pain assessment and management. This education should focus on the patient, family, caregivers, and clinicians. Krasner⁵¹ noted clinicians need to become more sensitive to pressure ulcer pain and respond to it. Continued pressure ulcer pain research is needed to identify the most effective methods of assessing and managing pressure ulcer pain across the age continuum and for special populations.

The NPUAP, in collaboration with the European Pressure Ulcer Advisory Panel, is developing pressure ulcer prevention and treatment guidelines with international application. These guidelines will be released at the NPUAP Biannual Conference in Arlington, Virginia, February 27 – 28, 2009. Specific recommendations will be made for management of pressure ulcer pain.

Further research is needed about pressure ulcer pain, including the degree and type of pain for each pressure ulcer stage. Research questions might include: Are certain topical analgesics more effective for pain in different stages of pressure ulcers or on pressure ulcers in different body locations? Are certain systemic analgesics more effective for pain in different stages of pressure ulcers? Are certain analgesics more effective for acute pressure ulcer pain? What analgesic issues are relevant to chronic pressure ulcer pain? Are certain analgesics, whether topical or systemic, more effective for different aged individuals with a pressure ulcer? What are analgesic concerns and effectiveness issues for individuals with a history of substance abuse or for individuals at the end of life? What is the most effective timing schedule of analgesic medications in relation to effective nutrition and fluid intake? How can pain scale ratings be used to guide medication or dressing selection for a person with a pressure ulcer? What is

the best method to assess the presence of pressure ulcer pain and to assess if pressure ulcer pain is relieved in the non-cognitively intact individual or in children? Research also might consider pain management strategies including, but not limited to, medications and nonpharmacologic strategies such as physical and occupational therapy, counseling, music, massage, and relaxation. The responses to these questions and concerns will help guide and improve care for patients with pressure ulcer pain. ■

Acknowledgment

The author thanks members of the National Pressure Ulcer Advisory Panel (NPUAP) Board of Directors 2007–2008 who provided critique of the manuscript.

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