

The assessment and management of pain and stress in wound care

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In the UK it is estimated that 200 000 patients have a chronic wound, which represents a significant burden to patients and the NHS. The cost to the NHS of caring for patients with chronic wounds is approximately £2.3bn–3.1bn per year (Posnett and Franks, 2008). Consequently, effective treatment and awareness of the impact of pain and stress could significantly reduce this cost. The effects of frequent wound treatments, such as dressing change, can interfere with daily routines including, sleep disruption, limited mobility, problems with odour, pain and psychological stress (Solowiej et al, 2009). Stress has been shown to contribute to the delayed healing of wounds in many studies of experimentally-induced wounds, surgical and chronic wounds. It has been suggested that pain itself can contribute to this relationship as it can be interpreted as a stressor by patients (Solowiej et al, 2009). Therefore, effective assessment and management of stress and pain during the wound care process could facilitate an improvement in the healing rates of chronic wounds.

Literature search

In this review, articles were identified using PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), British Nursing Index (BNI), Academic Search Complete, PsycINFO, and PsycARTICLES electronic databases. The literature search covered the period of 1988 to 2010. Keywords in various combinations included 'wound healing', 'psychological', 'physiological', 'stress', 'delayed healing', 'acute', 'chronic', 'wounds', 'pain', 'management' and 'assessment'. Articles were included based on their coverage of stress and pain measures; male and female participants; patients with chronic, surgical or biopsy wounds; review articles of the relationship between

stress, pain and wound healing; publication in peer-reviewed, English-language journals. Articles were excluded if they involved animal subjects, used case study methodology, or reviewed specific brands of dressings, because of problems with small sample sizes and generalizability of findings to wider populations of patients.

Pain, stress and delayed healing

Pain is a frequently reported symptom of chronic wounds, and can have a significant impact on patient quality of life (QoL) (Soon and Acton, 2006). Different types of pain can occur as a result of chronic wounds including, chronic pain from the wound itself (e.g. neuropathic pain), pain caused by wound treatments (e.g. nociceptive pain), and anticipatory pain (Solowiej et al, 2010). Wound treatments, specifically dressing removal and wound cleansing, have been reported as the most painful experiences associated with wounds (Kammerlander and Eberlein, 2002; Price et al, 2008), which can lead to stress and a subsequent reduction in pain tolerance. In other words, pain itself can have a negative impact on wound healing, as it can contribute to stress and other negative emotional states including fear, anxiety and depression (Woo et al, 2008). The perception of pain can be influenced by psychological, social and emotional factors, in addition to underlying physiological factors (Augustin and Maier, 2003). For example, patients may experience anticipatory pain before a dressing removal, based on previous experience of pain caused by this treatment. Both patients and practitioners understand that pain is a feature of chronic wounds, however, health professionals should be aware that it can cause stress in patients, which may delay healing (Soon and Acton, 2006).

Like pain, stress can also be described as a multidimensional concept as it comprises physiological, psychological and social factors. Physiologically stress can lead to increased levels of the hormone cortisol, which can result in elevated heart rate and blood pressure, and can have a negative impact on immunity (Ebrecht et al, 2004). Moreover, if a patient interprets 'painful' treatments in a negative way, physiological and behavioural responses can be influenced, for example a prolonged fight-or-flight reaction that can be detrimental to the patient's immune system (Adams et al, 2006). Overall, certain wound treatments can lead to anticipatory pain, stress and avoidance behaviour, from

Abstract

Wound pain can cause considerable suffering and distress to patients. Evidence suggests that there is a link between stress and delayed wound healing, and that pain itself is implicated in this relationship. It is essential that stress and pain are assessed and managed effectively during wound management, to promote the rapid healing of chronic wounds.

KEY WORDS

♦ Wound healing ♦ Stress ♦ Pain Assessment ♦ Management

which a delay in wound healing can occur (Solowiej et al, 2009).

Studies of experimentally induced biopsy wounds have demonstrated an association between stress and delayed wound healing. Marucha et al (1998) showed that biopsy wounds administered to dental students during an examination period, took an average of 3 days longer to heal in comparison with biopsy wounds administered during a summer break. These findings demonstrate that mild examination stress can have a negative impact on the speed of wound healing. On the other hand, Ebrecht et al (2004) aimed to investigate the influence of individuals' perceived stress on the healing of biopsy wounds. Questionnaires including the Perceived Stress Scale (PSS) (Cohen, 1983) and General Health Questionnaire (GHQ-12) (Goldberg, 1992) were used to measure stress and health behaviours (e.g. alcohol consumption, exercise, healthy eating, and sleep influences) in a sample of healthy male participants. In addition, saliva samples were obtained from participants to assess levels of the stress hormone cortisol. Higher scores on the PSS and GHQ-12 were found to be associated with slower healing when the biopsy wounds were administered. Similarly, cortisol levels were found to increase as the speed of wound healing decreased.

Kiecolt-Glaser et al (1995) demonstrated the impact of long-term, naturally-occurring stress caused by caring for a relative with Alzheimer's disease. Thirteen female participants caring for a relative with Alzheimer's disease were given a punch biopsy wound and asked to complete the 10-item PSS (Cohen, 1983). It was found that the carers reported significantly more stress, and wound healing took an average of 9 days longer in comparison with a control group.

Holden-Lund (1988) investigated the effects of a stress relaxation technique on a sample of 24 patients who had undergone abdominal surgery. The relaxation technique involved audiotapes designed to guide the patient's imagination toward a relaxed but focused state. Patients who experienced the relaxation technique were found to have significantly less anxiety, lower cortisol levels and less surgical wound erythema than a control group (who were not exposed to the audiotapes). It was concluded that the relaxation technique facilitated a reduction in stress, which was related to wound healing. Similar findings were obtained from a study in which preoperative stress was assessed in a sample of patients undergoing surgery

(Broadbent et al, 2003). Preoperative stress was measured using the PSS and healing was assessed from wound fluid samples obtained post surgery. Results indicated that greater preoperative stress predicted lower levels of proinflammatory cytokines in the wound fluid. Similarly, increased anxiety about the surgical procedure predicted lower levels of protease in the wound fluid, in addition to more painful and slower healing. Findings of surgical wound studies suggest that stress reduction interventions may improve wound healing in clinical practice. If wound repair is improved, this could also facilitate patients' recovery after surgery (Beilin and Shavit, 2003; Broadbent et al, 2003; Gojun et al, 2008).

Fewer studies have been conducted that focus specifically on the relationship between stress and chronic wound healing. The relationship between anxiety/depression and chronic wounds was investigated using the Hospital Anxiety and Depression Scale (HADS) among a sample of 53 participants (Cole-King and Harding, 2001). The study involved psychological and clinical assessment of wounds, with the investigators and participants blinded to the results. Findings revealed that delayed healing was related to a high score on the HADS, and the relationship between healing and anxiety/depression was statistically significant. Jones et al (2006) also used the HADS (Zigmond and Snaith, 1983) to assess the prevalence of anxiety and depression in 190 patients with venous leg ulceration, across nine trusts in the north-west of England. It was found that 53% of patients scored above the cut off for anxiety and depression categorization. Furthermore, pain and malodour were reported as the two symptoms most associated with anxiety and depression. As a result of these findings it was suggested that psychological factors, including anxiety and depression, should be assessed and managed for patients with chronic wounds, when cure is not an option.

The majority of studies appear to focus on the relationship between stress and wound healing; however, White (2008) conducted a multinational survey of patients with chronic wounds to establish the impact of pain caused by different types of dressings. A sample of 3034 patients was visited on two occasions by an investigator to assess pain (using a visual analogue scale) at dressing change. At visit one, the pain scores of patients being treated with traditional adhesive-based dressings were found to increase during dressing removal. In comparison, pain scores significantly decreased ($p=0.01$) at visit two after patients had been treated using soft-silicone adhesive dressings. These findings indicate that selection of appropriate dressings can reduce pain caused by dressing removal, which could also minimize pain-induced stress.

Assessment of stress and pain

In the assessment of stress and pain, it is important for wound care professionals to recognize that both are biopsychosocial concepts in order to gain a more holistic understanding of the patient's experience.

Box 1. Checklist of non-verbal pain indicators

Vocal expressions (moans, groans, cries, gasps).

Facial expressions (wincing, narrowed eyes, grimaces, clenched teeth).

Bracing (clutching bed rails, or the painful area).

Restlessness (hand movements, unable to remain still).

Rubbing (touching, holding or rubbing the affected area).

Source: Feldt, 2000

Table 1. Psychological measures of stress

Psychological measures	Purpose
The Perceived Stress Scale (PSS) (Cohen, 1983)	This questionnaire is designed to measure the degree to which patients perceive situations as stressful. Patients are required to indicate how often they have thought or felt a certain way during the last month. Higher scores indicate greater stress.
The State Trait Anxiety Inventory (STAI) (Spielberger, 1968)	This double-sided form is designed to measure state and trait anxiety. Two scores are obtained overall, one for the condition of temporary state anxiety and one for the condition of long-term trait anxiety.
The General Health Questionnaire (GHQ) (Goldberg, 1992)	The GHQ was developed to assess non-psychotic psychiatric disorder in patients in community and clinical settings. Patients are asked whether they have experiences specific behaviours or symptoms using a rating scale. Higher scores indicate higher emotional distress.
The Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983)	This questionnaire was designed for use in medical outpatient settings to identify cases of anxiety and depression. Higher scores indicate greater anxiety or depression.

Table 2. Physiological measures of stress

Physiological measure	Purpose
Salivary cortisol sampling	Cortisol is a hormone present in the saliva that is associated with stress. Saliva can be collected easily using swabs. Higher levels of cortisol indicate greater levels of stress.
Heart rate	Increased heart rate is a symptom associated with stress. The body responds to stress and prepares for 'fight or flight'. Heart rate can be monitored over time (e.g. before and after treatment).
Blood pressure	High blood pressure is a stress-related physiological symptom. Similar to heart rate, blood pressure can be measured at intervals over a period of time.
Galvanic skin response (GSR)	GSR is a measure of sweat gland activity associated with the body's stress response. Increased GSR is associated with greater stress. Non-invasive electrodes are attached to the finger tips or palms to measure GSR.

Simple observation of patients' behaviour can indicate important verbal and non-verbal signs of pain and stress. For example, Feldt (2000) developed a checklist of non-verbal pain indicators (*Box 1*). Behavioural indicators of stress can include increased breathing rate, muscle tension, sweating palms, dry mouth, tense voice, pale skin, and avoidance

behaviour (Solowiej et al, 2010). Behavioural signs of stress and pain can be very similar; therefore, it is important that wound care professionals can recognize these to enable successful assessment of individual patients.

Measures of stress can include both psychological and physiological methods. Psychological methods often involve self-report questionnaires that address a patient's emotional state. They enable practitioners to assess a patient's emotional response to their condition as opposed to physiological outcomes that could occur as a result of other factors. Some examples of psychological measures that have been widely used in research and would be appropriate for use in clinical practice (*Table 1*).

However, there are disadvantages of using self-report measures of stress if they are not accompanied by other methods. For example, patients may report high levels of stress in order to meet the expectations of the health professional delivering the questionnaire. Similarly, patients may answer questions in a certain way, such as selecting the middle options on a rating scale rather than the extreme responses (Johnson et al, 1995). In order to counteract this, physiological measures of stress can be used to compliment psychological assessments as they are less likely to be influenced by social biases (*Table 2*). Some physiological measures are likely to be part of routine wound care already, therefore these can be used in addition to psychological measures to establish a patient's psychological state.

Measuring pain during wound care is important to allow practitioners to understand the pain experienced by patients during treatment. Pain assessment provides an important basis for the selection of appropriate pain management techniques, with a view to minimizing the stress associated with this. Methods of assessing pain often include a rating scale for patients to indicate the amount of pain they are experiencing (*Table 3*).

Management of stress and pain

As it has been established that unresolved pain, leading to stress, can result in prolonged wound healing (Reddy et al, 2003), every patient should have regular pain and stress assessment. In a study by Woo et al (2007) implementation of clear, concise best practice guidelines were shown to significantly improve patients' reported pain scores (on a numerical scale). At the start of the study 61.3% of patients from a sample of 111, reported that pain was a significant problem with their wound. After best practice guidelines were introduced, pain ratings decreased from 6.3 at week 1 to 2.8 at week 4. In addition to this, wound healing was found to have significantly improved in patients receiving suitable pain management.

There are many ways in which pain and stress can be managed in order to promote faster wound healing. Research has shown that selection of appropriate dressings can significantly reduce pain at dressing change (White, 2008). Dressings that do not cause further trauma or damage to the wound and surrounding skin, will facilitate a reduction in pain caused by dressing removal (World

Table 3. Pain assessment methods

Pain measure	Purpose
McGill Pain Questionnaire (MPQ) (Melzack, 1995)	Multidimensional measure that assesses the different components of pain. Assesses how pain changes over time. Identifies factors that relieve or worsen pain. Includes a measure of pain intensity.
Verbal/Numerical Pain Rating Scale	Scale consists of a list of describing words (no pain – severe pain) or numbers (0-10). Patient is required to indicate their current level of pain using the scale. Higher scores indicate more intense pain.
Visual Analogue Scale	Patients are asked to draw a cross on an unmarked line with pain descriptors at each end. Unlike verbal / numerical scales, patients are less likely to recall previous ratings, which reduces the effects of practice bias.

Union of Wound Healing Societies (WUWHS), 2007). Practitioners should select the most suitable dressings for individual patients to ensure pain is minimized at dressing change. A number of strategies were also identified in the European Wound Management Association (EWMA) position document on pain at wound dressing changes (2003). These included soaking old dressings to facilitate removal, and selecting non-traumatic dressings and dressings that offer pain-free removal to minimize pain at dressing changes.

Many studies have been conducted to explore the effect of adopting strategies to cope with pain and stress. Different strategies are effective for different patients, for example Miller et al (1992) demonstrated the effects of a distraction technique on patients with burn pain. Patients were shown a video of picturesque scenery accompanied by music during their dressing changes to distract them from their pain experience. Pain was assessed using the MPQ and anxiety was measured using the STAI. It was found that patients who were distracted from their dressing change reported significantly lower pain and stress scores than a control group who did not receive a distraction therapy. This would suggest that if patients show

a preference for distraction during wound treatments, then coping techniques of this nature would be beneficial for managing pain and stress. In a community setting, this technique could be administered by allowing patients to watch the television or listen to music while they undergo wound treatment.

Alternatively, coping strategies can also include focusing on the sensory aspects of wound treatment. For example, during wound cleansing, patients could be encouraged to focus on the sensations of the cleansing solutions as opposed to the pain caused by this treatment. Keogh and Mansoor (2001) demonstrated the effects of the sensory focus technique to minimize pain among a sample of female participants. Results showed that participants reported greater pain when asked to ignore it, in comparison with participants who were asked to focus on the sensations of a cold compress. These findings indicate that encouraging patients to focus on sensations other than their pain can help to reduce pain caused by wound treatments.

As well as reducing pain during wound care, interventions should be implemented to minimize patient stress. Research has shown that social support can facilitate a reduction in psychological stress (Edwards et al, 2005; Franks and Moffatt, 2006; King, 2003). The direct-effects hypothesis highlights that social support can reduce the risk of illness as it can influence a patient's perception of control and available coping resources (Brown, 2008). Building upon this, the buffering hypothesis explains that social support networks (i.e. family and friends) can help to improve wellbeing and act as a defence against the negative impact of stress (Carver, 2008). This would suggest that a holistic approach to patient care should be adopted for patients with wounds, to prevent social isolation which can contribute to stress. Example of social support interventions are Leg Club environments, which provide a setting for patients to share problems and socialize with individuals who share similar wound experience. Research has shown that wound healing and recurrence improved when patients had been educated and maintained contact with wound care professionals and other patients at leg ulcer clinics (Brown, 2008; Edwards et al, 2005). This suggests that social support can help to reduce stress, and interventions to promote social support can be beneficial for patients.

Conclusion

It is clear from the literature that there is increasing evidence for the relationship between stress and wound healing. Studies of biopsy, surgical and chronic wounds have shown that stress can impact the healing of different types of wounds. However, fewer studies have been conducted that address the role of pain in this relationship. It is known that patients can interpret pain itself as a stressor; therefore practitioners should take this into account when administering wound treatment.

Tools that can be used in clinical practice for assessment of stress and pain have been identified from the literature.

Key points

- ◆ Chronic wounds are a significant burden for patients and the NHS
- ◆ Pain caused by wound treatments can contribute to psychological stress, which in turn can delay healing
- ◆ Prolonged healing of wounds can impact patient well-being
- ◆ Pain and stress assessment tools should be incorporated into routine wound care
- ◆ Effective assessment can lead to successful management of pain and stress, which could promote wound healing

It is acknowledged that time and resources need to be allocated for training practitioners in their use. However, if measures are incorporated into the wound care process, patient care and resource costs will improve as a result. If stress and pain are assessed effectively, this will lead to the most appropriate management options for individual patients. For example, appropriate dressing selections can significantly reduce pain and its impact as a stressor. Furthermore, individual patients' preferences for different coping techniques can improve their experience of stress and pain during certain wound treatments. Social support interventions have been shown to improve wound healing for patients as a result of the positive environment they create. The beneficial impact of social support should be investigated further to demonstrate the potential to improve healing and recurrence rates, in addition to wound/medical treatment.

Future research should focus on the role of pain in the relationship between stress and delayed wound healing. Interventions and techniques to minimize stress and pain that could be easily incorporated into wound care should also be investigated, in order to facilitate faster wound healing and promote patient wellbeing.

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