

Managing pain and stress in wound care

Virtually all patients that have a wound, be it chronic or acute, suffer pain to some degree. Pain can arise from different wound care treatments, such as inappropriate dressing choice, sharp debridement of devitalised tissue, wound cleansing and dressing change. One body of research and practice-related observation has indicated that pain and stress play fundamental roles in wound care, whether in an acute or primary care setting (Solowiej et al, 2009). Such pain, or the anticipation of pain, can have a detrimental effect on physical functioning and cause psychological distress as well as reduced quality of life. Thus, healthcare professionals should review their practice to ensure that it is effective and aims to reduce pain.

Clifford Richardson, Dominic Upton

KEY WORDS

Wound pain
Stress management strategies and techniques
Analgesic medication and non-pharmacological interventions

Given that links between pain and the development of stress have been established (Soon and Acton, 2006; Solowiej et al, 2010), a large proportion of stress may disappear if wound pain is well managed. If stress at dressing change or when dealing with the wound is reduced, the pain-stress-pain circle can be broken, thereby improving the physical and psychological health of the patient.

A systematic approach is useful to ensure that all aspect of pain and its consequences are covered during wound care. One such approach is to utilise the Manchester P.A.I.N model (Keyte and Richardson, 2010), which involves preparation, assessment, intervention and normalisation.

Dominic Upton is Professor of Psychological Sciences and Chair of Health Psychology, University of Worcester; Clifford Richardson is Lecturer, School of Nursing, Midwifery and Social Work, University of Manchester

Preparation

Pain is a biopsychosocial phenomenon hence the psychological and social contexts need to be taken into account alongside physical aspects, if pain is to be comprehensively and successfully managed. Within the preparation stage good interpersonal skills and therapeutic relationship building are essential. Discussing these in depth is beyond the remit of this article, but these principles must be applied to ensure that the best conditions for pain and stress management are capable of being achieved. Practitioners must create environments where the patient is as relaxed as possible and where they are comfortable with their surroundings in order to facilitate optimal pain management. Within the preparation stage, practitioners should also examine their own thoughts and feelings about the wound and any associated pain. As neuropathic or centrally maintained pains can exhibit unusual symptoms such as allodynia or hyperalgesia, practitioners may be faced with novel situations which vary from person to person even when the clinical presentation of the wound is similar. Such circumstances require open-mindedness and a non-pejorative approach. It is essential to recognise that the management of acute pain (pain that is of recent onset with expected duration of less than three months) requires different skills to the management of chronic pain (pain which has been

present for longer than three months) (International Association for the Study of Pain [IASP], 2011).

Assessment

Accurate assessment of pain is essential for comprehensive and effective management. However, pain assessment in people with wounds is complex and needs practitioners to compartmentalise various aspects of pain and wound care. This is because there are different kinds of wounds and various forms of pain. A one size fits all approach will not work, hence practitioner's require a flexible and open-minded attitude. For ease of description *Table 1* shows some of the key variations in pain experienced due to the presence of a wound.

Acute and procedural pain are readily assessed using uni-dimensional intensity scales such as the visual analogue (VAS) or numerical rating score (NRS) (Breivik et al, 2008). There are various forms of these scores, but, to enable fine-tuning, especially following re-assessment, scores of 0–10 probably have better practice utility than those that use 0–3 or 0–5 (Breivik et al, 2008). On a population level it is likely that higher scores mean worsening pain and those high scores need higher priority to reduce. Anecdotal experience however, can often identify that certain individuals can magnify or under-play the pain intensity, hence practitioners need to be vigilant and treat

Table 1**Variations of pain due to the presence of acute and chronic wounds**

Wound type	Pain type
Acute	Acute background pain
Acute	Acute/procedural pain during dressing change
Chronic	Chronic nociceptive background pain
Chronic	Chronic neuropathic background pain
Chronic	Acute/procedural pain during dressing change
Chronic	Neuropathic pain during dressing change

all patients as individuals (Nielsen et al, 2009).

Intensity scores are less effective for chronic pain and often people experiencing chronic pain show little variation in their pain intensity over long periods of time (Stomski et al, 2010). Assessing chronic pain therefore requires a deeper understanding of the underlying contributors to the pain. Important questions to ask relate to what makes the pain better or worse. These could be physical things such as positioning or psychosocial things such as being with friends/family or watching the TV (Breivik et al, 2008). Identifying neuropathic elements of chronic pain are crucial to the potential effective management of chronic pain. Therefore, taking time to question the patient about pain within the wound and peri-wound area and also their experiences during previous dressing changes, will arm the practitioner with the knowledge of how to reduce background pain and also pain during dressing changes.

Specific neuropathic pain scales such as the Neuropathic Pain Scale (Galer and Jensen, 1997) can be useful for chronic pain as well as multi-dimensional pain scoring systems such as the Brief Pain Inventory (BPI) (Cleeland and Ryan, 1994), as these include measurement of aspects of all of the biopsychosocial elements of pain.

Intervention

Pain arises from a complex interaction between our peripheral nerves, the spinal cord and multiple areas of the brain. Ascending and descending pathways constantly interrelate and modify painful sensations that will be perceived. Due to these intricacies, it is unlikely that any single pharmacological agent will be effective. Instead, the overriding principle required for wound pain management is the multi-modal approach (Hollinworth, 2005; White, 2008). This applies to ongoing pain management required when a wound is continuously painful and also to the important aspect of dressing change, which is known to be particularly problematic in terms of inducing pain (Lloyd Jones, 2004; Woo et al, 2009).

The multi-modal approach embeds the World Health Organization (WHO) analgesic ladder (WHO, 2010) into practice and ensures that all areas of the pain pathways are targeted to try and reduce pain. In an attempt to be as comprehensive as possible, each analgesic medication will be discussed in turn with clarification of which wound and pain types each will be useful for:

Paracetamol (acetaminophen)

Despite its widespread use, paracetamol's mode of action remains to be fully resolved. However, it is thought to work mainly on central and descending pain pathways (Remy et al, 2006; Duggan and Scott, 2009). Traditionally, paracetamol is the bottom rung of the WHO analgesic ladder, however it is a strong analgesic and can be used alongside most other pharmacological agents (Guindon et al, 2007). Its use can potentiate the analgesic effects of non-steroidal anti-inflammatory drugs (NSAIDs) and promote morphine sparing effects when utilised with strong opioids for acute pain (Guindon et al, 2007).

Paracetamol should be the basis for analgesia for acute and chronic pain when associated with acute and chronic wounds (Nikles et al, 2005; Remy et al, 2006). If a wound is continuously painful, paracetamol should be administered on a regular basis and at maximal dose, i.e. 4g/24hr unless a lower dose has

been found to be adequate during full assessment. If the wound is only painful during a dressing change, paracetamol (1g) should be administered orally at least one hour beforehand. If pain persists beyond the conclusion of the dressing change, a follow-up dose may be required (4–6 hourly).

Non-steroidal anti-inflammatory drugs (NSAIDs)

NSAIDs have analgesic and anti-inflammatory effects at the site of injury, in this case the wound. This is thought to be due to the blockade of enzymes called cyclo-oxygenases (COX-1 and COX-2). Cyclo-oxygenases synthesise prostaglandins, a group of chemicals with multiple different actions, one of which is to sensitise nerve endings to pain. When the cyclo-oxygenases are blocked there is less prostaglandin produced in the wound area, thus the nerves are less sensitised to pain (Guindon et al, 2007). This causes a perceived pain reduction.

NSAIDs have well-known side-effects including gastric irritation and can cause cardiac and renal compromise. This means that they must be utilised within their scope of use and practitioners must check for contraindications before administration. As NSAIDs have a separate mode of action to paracetamol and there are no compatibility issues, they can be used together to treat procedural pain at dressing change and background pain for any wound. This satisfies the multi-modal approach to pain management. Again, if used for background wound pain, NSAIDs need to be administered regularly and at a dose found to be effective by strict pain assessment. If used for dressing change, the NSAID will need to be administered orally at least an hour in advance to allow for the reduction in prostaglandin to occur. NSAIDs have also been shown to be opioid sparing when used together for acute pain (Guindon et al, 2007).

Weak opioids

Step two of the WHO analgesic ladder adds the weak opioids such as codeine to paracetamol and the NSAIDs. Codeine, like all other opioids, has a receptor mechanism for its action. These receptors are found throughout the nervous system and therefore have a central mode of

action. By far the highest concentration of opioid receptors are found in the dorsal horn of the spinal cord, the area known as the 'gate' within the gate control theory (Holden et al, 2005). Administering an opioid will reduce the ascending pain impulses and therefore modify pain perception in the brain. This is a third pain relief mechanism.

If a mixture of paracetamol and NSAID is not effective for background wound pain, add a weak opioid at a dosing frequency that is sufficient to control the pain. This can only be judged by regular assessment and reassessment. If used to cover pain at wound dressing change, oral codeine should be given at least one hour before.

Unlike many opioids, codeine has a ceiling dose above which there is no additional analgesia, hence a maximum dose around 240mg/day is often recommended (British National Formulary [BNF], 2011). Additionally, codeine is known to have variable efficacy within the population. This is due to the fact that codeine is a pro-drug and requires to be modified to the active drug prior to effect. The modification converts codeine to the active codeine 6-glucuronide and morphine using the enzyme CYP2D6 (Stamer and Stuber, 2007). However, some people do not have the active enzyme and others have too little to convert sufficient codeine to elicit analgesia. This means that codeine is ineffective in approximately 10% of the population (Stamer and Stuber 2007). Poulsen et al (1998) suggested that this could be more than 40% in highly stressed populations (such as postoperative patients). Wound care may also be one such group. If, following pain reassessment after repeated doses of codeine, a practitioner suspects that codeine is not delivering additional analgesia, it should be discarded in favour of alternative weak opioids such as tramadol.

Tramadol has opioid receptor activity alongside effects that increase serotonin levels and reduce noradrenaline levels which may also contribute to analgesia. Due to the fact that all of these mechanisms are different from

paracetamol and NSAIDs, they can all be administered without contraindication.

Strong opioids

The gold standard strong opioid is morphine. It is at the top of the WHO analgesic ladder and should only be considered for wound care if there remains insufficient pain relief from the combined analgesia from the previous steps on the ladder. Morphine is flexible in that it can be administered via all routes with no ceiling dose, thus can be titrated to a dose which is effective for individual patients. In extreme cases, morphine may be considered for pain relief of background wound pain. Practitioners must be ready to reduce the dose once healing starts and the pain lessens. Morphine can also be used for dressing change. If given orally (the preferred route), it must be delivered at least an hour before the procedure, as with other drugs.

Familiarity with the actions and side-effects of opioids is essential if good analgesia is to be achieved. Firstly, it should be recognised that oral opioids are all variably digested within the gut. Up to 66% of morphine may be lost, hence to ensure that the dose required is received it may be necessary to treble the dose, i.e. the starting dose may need to be 30mg if the target dose is 10mg (Shaheen et al, 2009). The side-effects of opioids include constipation, nausea/vomiting, sedation and respiratory depression (McNicol et al, 2003). When titrated and maintained at a constant dose, all side-effects become tolerated except constipation which requires prophylactic and ongoing treatment with laxatives (Plaisance and Ellis, 2002).

If used solely at dressing change, the blood levels of morphine cannot be maintained at steady levels and so practitioners need to observe for all side-effects including problematic respiratory depression and sedation each time a dose is administered. Usually pain is the antidote to respiratory depression from the opioids, however, if delivered during a pain-free period in preparation for painful dressing changes, close monitoring is required to ensure that the patient remains safe.

Although many strong opioids are available, morphine, remains the gold standard as it is cheap and practitioners have experience of it in practice. If used alongside analgesics on the lower rungs of the WHO ladder, the opioid dose required will be lower than if used as an individual drug.

Co-analgesics

Within the WHO analgesic ladder is the addition of co-analgesics which treat the non-nociceptive elements of pain. Neuropathic pain and its associated symptoms such as allodynia and hyperalgesia is often coincident with nociceptive pain but unresponsive to the same drugs. As neuropathic pain is generated from within the nerves themselves medication has to be targeted to this area. Co-analgesics that have been found to be useful for neuropathic pain are the antidepressive and anticonvulsant drugs. Common examples are amitriptyline and gabapentin, but most antidepressives and anticonvulsants have been utilised with effect in some people. Doses are often lower than those used for their original purpose and should be started low and increased slowly to minimise potential side-effects. Practitioners would be wise to seek advice from pain specialists if they consider neuropathic pain to be an issue.

Nitrous oxide

Various percentages of nitrous oxide are available. The most commonly utilised strength is a 50:50 mixture with oxygen. There are various trademarked versions of this mixture and it is a good analgesic to target painful dressing changes. Its mode of action for analgesia is unclear, but it is thought to act via the induction of endogenous opioids (Fujinaga, 2005). It is self-administered by the patient via a facemask or mouthpiece which enables inhalation and rapid onset of action. Nitrous oxide has few side-effects or contraindications and it can be used alongside all other analgesics. Traditionally, nitrous oxide was used as an anaesthetic so can cause sedation at high doses. The 50:50 mixture is however low enough that few cases of sedation are seen. Self-administration introduces safety because, if sedation occurs, the patient's hand drops away from their face, taking

least teach people how best to cope with it. Stress management can be defined as the application of methods to reduce the impact of stress.

Dealing with the stressor

The first method of reducing stress is to remove the stressor if at all possible. We could take away or modify the demands or exposure to potential stressful conditions. For example, if the person gets 'stressed out' whenever they ride a horse, do not go near a horse. While this might be relatively easy to achieve with certain stressors, patients with chronic wounds cannot avoid dressing changes or other wound management interventions. Clinicians have often reported on patients that have avoided wound care and suffered significant negative physical health consequences. Hence, what the clinician has to do is alter the nature of the stressor — if a particular wound management technique results in stress, then the clinician should consider changing the technique.

Wound dressings that include alginate, film, foam, hydrocolloid and hydrogel, have all been reported to cause pain and tissue trauma during dressing changes (Hollinworth and Collier, 2000) and potentially, therefore, stress and anxiety. However, the introduction of dressings utilising Safetac[®] adhesive technology (Mölnlycke Health Care) has facilitated a reduction in many of these issues (Davies and Rippon, 2008). Safetac adhesive technology involves the use of soft silicone, which readily adheres to intact dry skin and remains in situ without adhering to or damaging a moist wound with fragile tissue (Davies and Rippon, 2008). A number of clinical studies have shown that trauma related to the removal of adhesive dressings can be reduced or even prevented entirely if more appropriate dressings are used, for example, dressings using Safetac technology (Dykes et al, 2001; Dykes, 2007). Furthermore, White (2008) found that dressings with Safetac adhesive significantly reduced pain and trauma at dressing change among a large sample of patients, presenting a variety of wound types. Also, 90% of patients involved in the

study reported that they preferred the dressings with Safetac to their previous dressing treatments. Overall, dressings with Safetac have been documented to be less painful, before, during and after dressing change when compared to other dressings with traditional adhesives (World Union of Wound Healing Societies [WUWHS], 2007). It would therefore seem appropriate that if changing the dressing type can reduce the pain associated with the wound care management, this can result in stress reduction and thereby interrupt the stress-pain-impaired wound healing cycle. Hence, clinicians need to consider the most appropriate dressing for the wound and for the individual patient.

If the person cannot avoid the stressor, perhaps attempting to get the person to reappraise the situation may prove beneficial (i.e. change the primary appraisal). Rather than seeing the wound management as a stressor, get the person to see the visit in a more positive light, as improving their health, removing pain, etc. This approach underlies many cognitive behavioural interventions and may need professional assistance.

Dealing with how a patient copes with wound care is another approach — the secondary appraisal section of the model. It relies on teaching the patient appropriate coping techniques. This may include increasing social support — sharing experiences and emotions with others in similar situations, or discussing how to progress improvements with family and friends. Alternatively, it can involve taking positive steps to deal with the pain, the wound and the stress: relaxation, active management of the wound or reappraisal of the current situation.

Stress management can address stress responses directly through relaxation training, biofeedback, visual imagery and meditation techniques. The basic premise of relaxation for stress is that it is the opposite of arousal — so relaxing should be a good way to reduce stress. A number of methods have been used to induce relaxation. The most frequently mentioned in psychological terms is Progressive Muscle Relaxation

(PMR). PMR originated from the work of Jacobson in the 1920s and 1930s. Jacobson (1938) proposed that the main mechanism influencing relaxation lies with the patient's ability to tell the difference between tension and relaxation. PMR involves the successive tensing and relaxing of various muscle groups.

Reducing stress at dressing changes or associated wound management procedures can have a number of positive consequences on the physical health of the individual patient. In particular, the stress associated with wound care can heighten pain and reduce quality of life. It is important that the clinician considers this potential stress when dealing with the patient and their wound. At its most simple, reducing pain and anticipatory pain can result in reducing stress — both at treatment and anticipation of the treatment (Woo, 2010).

There are other components of clinical practice that can produce stress and consequently increase pain perception and reduce wound healing (Richardson and Upton, 2010). For example, the communicative interaction between the healthcare professional and the patient, the environment of the treatment, the perception of the patient on the form, and outcome of the treatment.

For each of these there are specific psychological approaches to stress management that can be applied by the individual clinician during wound care management. For example, ensuring a calm environment throughout the procedure can be useful. Other techniques including visual imagery or relaxation training can assist. If the patient is told to think about something nice and pleasant, this may reduce stress and alleviate pain. For example, asking the patient to imagine lying on a beach with the waves gently lapping the shore and a summer breeze wafting through the palm trees (note the therapist is guiding the imagery). However, it does not have to be a gentle relaxing scene, some patients may imagine they are in a horse race or a football crowd.

Similarly, distraction can assist with reducing stress. This is a technique where the focus of attention is away from the stressful experience. For example, if there is something for the patient to do or concentrate upon when undergoing treatment this may reduce stress and pain. Getting the patient to sing a song, or do multiplication tables are other techniques which may help to distract the patient from the procedure.

Conclusion

Stress and pain are intimately linked and these two biopsychosocial concepts can lead to impaired wound healing, poor quality of life and a vicious cycle of increased pain and stress and poor wound healing. There are a number of techniques, both medical and psychological, available to the healthcare professional that can help to resolve these issues. These need to be employed successfully in the health care setting to ensure that the patient's health is maximised and the stresses and pains associated with wound care are minimised. **WUK**

References

- Breivik H, Borchgrevink P, Allen SM, et al (2008) Assessment of pain. *Br J Anaesth* 101(1): 17–24
- British National Formulary (2011) Codeine phosphate. BNF, London. Available online at: www.medicinescomplete.com/mc/bnf/current/3514.htm
- Charles H, Callicot C, Mathurin D, Ballard K, Hart J (2002) Randomised, comparative study of three primary dressings for the treatment of venous ulcers. *Br J Community Nurs* 7(6 suppl): 48–54
- Cleeland CS, Ryan KM (1994) Pain assessment: global use of the Brief Pain Inventory. *Ann Acad Med, Singapore* 23(2): 129–38
- Davies P, Rippon M (2008) Evidence review: the clinical benefits of Safetac technology in wound care. MA Healthcare Ltd, London
- Duggan ST, Scott LJ (2009) Intravenous paracetamol (acetaminophen). *Drugs* 69(1): 101–13
- Dykes PJ (2007) The effect of adhesive dressing edges on cutaneous irritancy and barrier function. *J Wound Care* 16(3): 97–100
- Dykes PJ, Heggie R, Hill SA (2001) Effects of adhesive dressings on the stratum corneum of skin. *J Wound Care* 10(2): 7–10
- Fairhurst M, Wiech K, Dunckley P, Tracey I (2007) Anticipatory brainstem activity predicts neural processing of pain in humans. *Pain* 128: 101–10
- Fujinaga M (2005) Mechanisms of nitrous oxide-induced analgesic effects. *International Congress series* 1283: 132–6
- Galer BS, Jensen MP (1997) Development and preliminary validation of a pain measure specific to neuropathic pain: the Neuropathic Pain Scale. *Neurology* 48(2): 332–8
- Guindon J, Walczak J-S, Beaulieu P (2007) Recent advances in the pharmacological management of pain. *Drugs* 67(15): 2121–33
- Holden JE, Jeong Y, Forrest JM (2005) The endogenous opioid system and clinical pain management. *AACN Clinical Issues* 16(3): 291–301
- Hollinworth H (2005) The management of patients' pain in wound care. *Nurs Standard* 20(7): 65–73
- Hollinworth H, Collier M (2000) Nurses' views about pain and trauma at dressing changes: results of a national survey. *J Wound Care* 9(8): 369–73
- International Association for the Study of Pain (2011) Available online at: www.iasp-pain.org
- Jacobson E (1938) Progressive Relaxation. University of Chicago Press, Chicago
- Keyte D, Richardson C (2010) Re-thinking pain educational strategies: Pain a new model using e-learning and PBL. *Nurse Educ Today* 31(2): 117–2
- Krasner D (1995) The chronic wound pain experience. *Ostomy Wound Management* 41(3): 20–5
- Lloyd Jones M (2004) Minimising pain at dressing changes. *Nurs Standard* 18(24): 65–70
- MacBride S, Wells ME, Hornsby C, Sharp L, Finnilla K, Downie L (2008) A case study to evaluate a new soft silicone dressing, Mepilex lite, for patients with radiation skin reactions. *Cancer Nurs* 31(1): E8–E14
- McNicol E, Horowicz-Mehler N, Fisk RA, et al (2003) Management of opioid side effects in cancer-related and chronic noncancer pain. A systematic review. *J Pain* 4(4): 231–56
- Melzack R, Wall P (1996) *The Challenge of Pain*. Penguin, London
- Nielsen CS, Staud R, Price DD (2009) Individual differences in pain sensitivity: measurement, causation, and consequences. *J Pain* 10(3): 231–7
- Nikles CJ, Yelland M, Del Mar C, Wilkinson D (2005) The role of paracetamol in chronic pain: an evidence-based approach. *Am J Therapeutics* 12(1): 80–91
- Plaisance L, Ellis J (2002) Opioid-induced constipation. *Am J Nurs* 102(3): 72–3
- Poulsen L, Riishede L, Brosen K, Clemensen S, Sindrup SH (1998) Codeine in post-operative pain. Study of the influence of sparteine phenotype and serum concentrations of morphine and morphine-6-glucuronide. *Eur J Clin Pharmacol* 54(6): 451–4
- Remy C, Marret E, Bonnet F (2006) State of the art of paracetamol in acute pain therapy. *Curr Opin Anaesthesiol* 19(5): 562–5
- Richardson C, Upton D (2010) A discussion of the potential mechanisms for wound dressings' apparent analgesic effects. *J Wound Care* 19(10): 42–30
- Shaheen PE, Walsh D, Lasheen W, Davis MP, Lagman RL (2009) Opioid equianalgesic tables: Are they all equally dangerous? *J Pain Symptom Management* 38(3): 409–17
- Solowiej K, Mason V, Upton D (2009) Review of the relationship between stress and wound healing: part 1. *J Wound Care* 18 (9): 357–66
- Solowiej K, Mason V, Upton D (2010) Psychological stress and pain in wound care, part 3: management. *J Wound Care* 19(4): 153–5
- Soon K, Acton C (2006) Pain-induced stress: a barrier to wound healing. *Wounds UK* 2(4): 92–101
- Stamer UM, Stuber F (2007) Genetic factors in pain and its treatment. *Curr Opin Anaesthesiol* 20(5): 478–84
- Stomski NJ, Mackintosh S, Stanley M (2010) Patient self-report measures of chronic pain consultation measures: a systematic review. *Clin J Pain* 26(3): 235–43
- Watson A, El-Derey W, Domenico Iannetti G, et al (2009) Placebo conditioning and placebo analgesia modulate a common brain network during pain anticipation and perception. *Pain* 145: 24–30
- White R (2008) Pain assessment and management in patients with chronic wounds. *Nurs Standard* 22(32): 62–8
- World Health Organization (2010) The pain analgesic ladder. WHO, Geneva. Available online at: www.who.int/cancer/palliative/painladder/en/
- World Union of Wound Healing Societies (2007) Principles of best practice: Minimising pain at dressing related procedures. A consensus document. Toronto Ontario, Canada: WoundPedia Inc
- Woo KY, Coutts PM, Price P, Harding K, Sibbald RG (2009) A randomized crossover investigation of pain at dressing change comparing 2 foam dressings. *Adv Skin Wound Care* 22(7): 304–10