Standard versus polymeric membrane finger dressing and outcomes following pain diaries

KEY WORDS
- Fingertip injuries
- Pain assessment
- Dressing evaluation

This article reviews the literature on fingertip injuries, physiology, pain management, assessment and the relationship between pain and sleep. A small audit was undertaken in an Accident and Emergency Department in a general hospital and minor injuries unit. Patients' perceptions of pain were captured using patient dairies for 14 days along with sleep patterns, analgesia use and quality of life. The Standard Dressing (SD) (*n*=19) and the Polymeric Membrane dressing finger dressing (PM) (*n*=20) had similar finger injuries. Pain in the PM group decreased after 8 days. SD was bulky and fell off within a day; the PM dressing lasted between 2–6 days. Patient outcomes on the PM included being comfortable, with the dressing easily removed and reduced the pain for the patient.

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This article reviews the literature on fingertip injuries, physiology of pain management and assessment of these injuries. Assessment of pain using a recognised pain assessment tool is essential and can impact greatly on a patient quality of life. This article presents the results of a small dressing evaluation that also employed daily patient pain dairies for 14 days. The standard dressing group of Mepitel® (Mölnlycke Health Care), Melolin® (Smith & Nephew) and Tubinette® (Mölnlycke Health Care) was compared to the PolyMem finger dressing (Ferris Mfg Group) for wound healing by secondary intention. The audit was undertaken in a medium-sized Accident and Emergency (A&E) department in a general hospital and minor injuries unit.

INTRODUCTION

Each year, almost 12,000 accidents in the UK involve children (0–14 years) who trap their fingers in windows or doors (The Royal Society for the Prevention of Accidents, 2013). Finger injuries are extremely common and the hand is prone to both domestic and industrial trauma. Fingertip injuries are often viewed as relatively minor injuries, but improper management can lead to considerable loss of skilled hand function and significant misery for the patient (Oetgen and Dodds, 2007). Delayed recognition or improper management of these finger injuries may result in chronic pain, stiffness and deformity. Even when appropriately treated, they can still lead to significant hand morbidity, affecting the occupational, as well as social, activities of the individual (Oetgen and Dodds, 2007; Cheung et al, 2013).

Fingertip injuries can be treated in a variety of ways and their management needs to be carefully individualised. If there is minimal tissue loss, the wound can be closed primarily with or without debridement. Many fingertip injuries can be treated by healing by secondary intention or open technique using a combination of wound contraction and re-epithelialisation without loss of sensation or fine motor control (Weichman et al, 2013).

The management of fingertip injury is complex and a variety of treatments are available. The goal of treatment in fingertip injuries includes:
- Preserving finger function and sensation
- Maximising functional length
- Preventing joint contractures
- Maintaining good cosmetic appearance and avoiding disfigurement and functional loss.

PAIN ASSESSMENT

Accurate assessment of pain prior to commencing treatment of the wound is essential for comprehensive and effective management (Solowiej and Upton, 2012). A careful history of how the pain and injury occurred must be taken as nerve endings may be damaged and necessary investigations, such as X-rays, may need to be undertaken. The

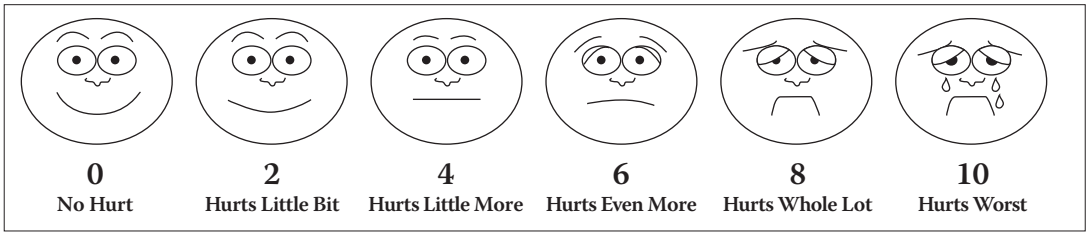

Figure 1. Please tick or circle the number from 1 to 10 of how your pain feels (adapted from Wong and Baker, 1998).

mechanism of injury needs to be identified, even when the wound appears to be superficial, as it may contain foreign substances, such as glass, metal or wood (Cheung et al, 2013). When non-accidental injury is suspected in a child or older person, the following information is important: when the injury occurred, whether there has been a delay in seeking medical attention, if the injury does not fit the history and if there is a presence of other injuries at different stages of healing (Jones, 2007).

As pain is a bio-psychosocial phenomenon, the psychological and social contexts need to be taken into account alongside physical aspects if pain is to be comprehensively and successfully managed (Richardson and Upton, 2011). Acute pain is usually nociceptive and caused by stimulation of peripheral nerve fibres, which send a 'pain message' to the brain when trauma is caused (Acton, 2008). Acute pain protects individuals as it acts as a warning of injury or harm and the need to limit tissue damage (Edwards, 2013). Even a superficial wound may be very painful because of the exposure of nerve endings. Pain relief, such as non-steroidal anti-inflammatory agents (e.g. ibuprofen) or simple opioids, such as co-codamol, giving information or employing distraction techniques have been found to be effective in helping to relieve pain (Jones, 2007). Psychological and environmental factors need to be considered alongside age, gender, previous pain history and the patient's ability to communicate their pain; all will affect the way the care pathway is performed (Acton, 2008).

PAIN ASSESSMENT TOOL

Minimising trauma and pain should be a key objective for all healthcare professionals involved in delivering wound care. Bell and McCarthy (2010) stated that healthcare professionals should have sufficient knowledge of evidence of pain assessment and dressing selection to reduce pain on dressing change. The International Association for the Study of Pain (IASP, 2004) endorses that healthcare professionals should have a good understanding of the mechanisms of pain, types of pain and any influencing factors on the patient perception of pain, as well as possessing the ability to assess and alleviate it (Edwards, 2013).

The patient is considered the most valid indicator of pain (Woo et al, 2008). The advantages of self-reporting are that there will be a consistent and clearly measurable record of any changes to the patient's pain levels.

A pain assessment tool should be used to assess the level of pain the patient is experiencing and needs to be easy to use. An example of this is the faces card that is particularly good for children and even adults in distress, as they can relate to the images easily (*Figure 1*). The same tool should be used consistently and should be used before, during and after any dressing change (Acton, 2008).

PAIN OF DRESSING CHANGE

Pain associated with dressing change is an important problem for patients, therefore, a reduction in patient pain is considered a high treatment priority (White, 2008). The World Union of Wound Healing Societies' (2004) consensus document on minimising pain at wound dressing-related procedures recommends that wound-related pain needs to be assessed and its intensity rated before, during and after dressing changes using a recognised pain scale. Accurate assessment should inform the healthcare professional's choice of dressing, based on exudate levels and tissue type (Benbow, 2010). The challenge lies in the correct identification of these factors and corresponding these with the correct dressing. It has been recognised that the highest levels of pain are associated with skin and wound damage that occurs during dressing changes

DECLARATION

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(White, 2008). Modern dressings are intended not to adhere to the wound surface or skin and, therefore, should not cause trauma or pain due to skin stripping (Benbow, 2010). Patients who use atraumatic dressings reported lower pain levels and psychological stress (Upton and Soleweij, 2012).

PAIN AND SLEEP

Pain may impact on a person's ability to sleep, which can heighten a person's pain perception, making it more difficult to sleep (Raymond et al, 2001). The lack of sleep has implications for a person's wellbeing and quality of life and their ability to perform activities of daily living. Sleep has been demonstrated to be essential for restoration and recovery of the body (Baldwin et al, 2001; Katz and McHorney, 2002; Reid et al, 2006; Hamilton et al, 2007). Pain, stress or anxiety related to pain has been discovered to delay wound healing (King and Harding, 2001; Ebrecht et al, 2004; Cole-McGuire et al, 2006; Upton and Solowiej, 2010; Woo, 2010).

There is lack of literature on pain, sleep and quality of life for patients with finger injuries. The majority of wounds studied have been chronic wounds and burns and postoperative pain (Leegaard and Fagermoen, 2008; Upton and Andrews 2013). A recent study monitoring pain analgesia and sleep patterns that patients experienced with radiotherapy-induced skin reactions demonstrated a rapid decline in pain scores between weeks one and three (Scott, 2013).

POLYMEM FINGER DRESSINGS

PolyMem finger dressings provide a mild, non-toxic cleansing agent that is activated by exudate and helps debride necrotic tissue and supports autolytic debridement. Glycerine (also known as glycerol) — a moisturiser contained in the dressing — keeps the dressing from adhering to the wound bed. Glycerine also reduces odours, soothes traumatised tissue and supports autolytic debridement. The wound fluid allows the natural growth factors and nutrients to concentrate in the wound bed (*Figure 2*); (Foresman et al, 1991; Hayden and Cole 2003; Benskin, 2006). The components of the dressing (glycerol and mild cleaning agent) work synergistically to provide continuous wound cleansing, thereby removing the need for manual cleansing. Wound bed cleansing is often procedural by nurses with saline (Fleck, 2007).

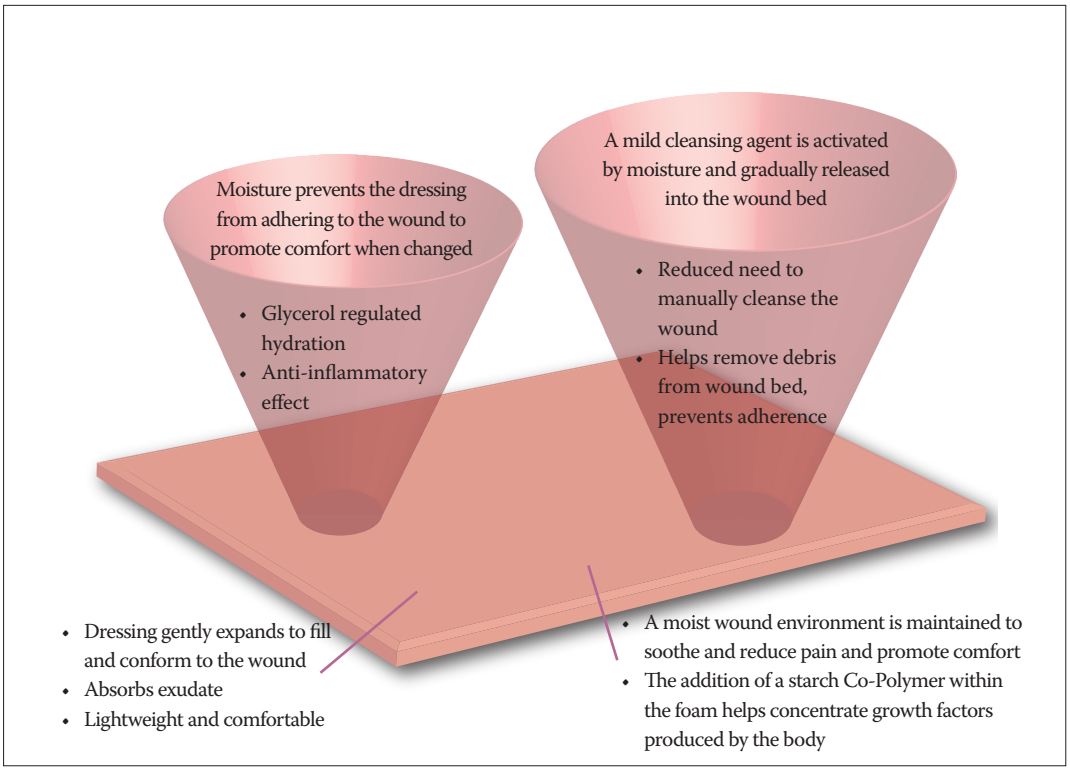

Figure 2. How PolyMem finger dressings work. Kind permission of Aspen Medical Ltd.

AIM

- To explore the patients' perceptions of pain by using pain dairies for 14 days
- To monitor the patients' sleep during those 14 days
- To monitor the analgesia taken by patients over the first 14 days
- To explore how the patients found the pain on dressing change
- To explore how patients' quality of life was affected during the 14 days
- To explore the nurses' perceptions of the dressing change
- To explore the economics of using the two finger dressings.

METHOD

An audit was completed of 39 patients, split between those given standard (SD) (*Figure 3*) and polymeric membrane (PM) finger dressings (*Figure 4*), in an A&E and a minor injury unit. Patient demographics, age, sex, nutrition, medical conditions, wound information and the site of the finger injury were recorded. Patients were encouraged to record their perceptions of pain in a daily diary using a numerical pain score (1–10) on the Wong and Baker scale (1998); (*Figure 1*). This pain scale also included a description: sharp/stabbing, dull/aching, continuous, intermittent and burning. Patients were given the opportunity to comment in their diaries over the 14 days. Details of analgesia used by the patients for their finger injuries were related to the World Health Organization's (WHO) analgesia ladder (WHO, 1986). Patients' sleep patterns were also measured in relation to their finger injury over the 14 day period. The person performing the dressing changes was recorded. Patients' perceptions of quality of life were collected using a modified Finlay and Khan (1994) Dermatology Life Quality Index at the end of the evaluation to see how the dressing had affected their daily life: pain over last 14 days, hygiene need, dressing independently, socialising, going to work, driving, domestic tasks and finger function. Nurses' comments were also collected on how they found the two dressings and their application.

This evaluation discusses a series of 39 case studies with finger injuries who were randomly selected from the A&E and minor injury unit. There was a broad age range, from 10 to 70 years. The finger injuries included a wide range of the types of the injuries seen in an A&E in a general hospital and minor injuries unit.

The first 19 patients were allocated the traditional finger dressing of Mepitel, Melolin and Tubinette. Training was delivered to the staff of the A&E and minor injury unit on how to apply the standard dressing, and how to complete the pain diaries and the consent form to have photographs to taken. Prior to the set of 20 case studies who were allocated the PM dressing, training was delivered on the properties of the dressing and how to measure and apply it. The evaluation was registered with the Clinical Audit department in the general hospital where the audit was completed.

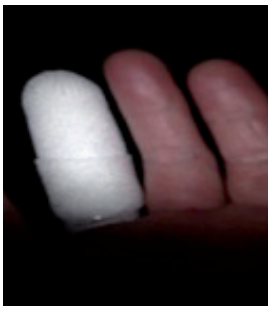

Figure 3. Standard dressing.

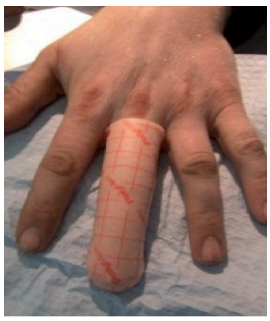

Figure 4. PolyMem finger dressing.

RESULTS

Standard dressing

The standard dressing group (*n*=19) had six females and 13 males. The ages ranged from 10–80 years (mean = 46 years). In this group, pain levels decreased at 7–8 days (*Figures 5*, *7*). The majority of patients had 6–8 hours' sleep. In the first 48 hours in this group, four patients took ibuprofen and three took paracetamol. Six of the dressing changes were performed by hospital nursing staff, five by practice nurses and eight patients changed the dressing themselves. Eight patients commented that the SD was poor or very poor, bulky, and noted that the dressing fell off within a day (*Table 1*). This meant dressing changes were being performed at between 1 and 6 days (mean = 2 days). Quality of life was not affected, as patients were able to function as normal and covered the dressing with a plastic bag to shower.

Polymeric dressing

The PM dressing group (*n*=20) had four females and 16 males. The age range in the PM group was 12–80 years (mean = 53 years). The majority of patients had 6–8 hours' sleep per night. In the PM group, the pain levels decreased after 8 days but this was not statically significant (*Figures 6, 7*). In the first 48 hours, eight patients took ibuprofen and seven took paracetamol. The PM dressing

Table 1. Standard dressing results.

Case No.	Sex	Age	Type of injury	Location of wound	Pain score on 1st dressing change	Pain score on 2nd dressing change	Wear time — in days	Patient rating of dressing
1	Male	30	Laceration	Left thumb	8	1	1	Very good
2	Male	24	Laceration	Left thumb	3	3	1	Good
3	Male	44	Glass cut	Left thumb	3	2	3	Very good
4	Male	33	Chain saw	Left thumb	8	2	2	Very goo6
5	Male	58	Chain saw	Left thumb	7	1	6	Very good
6	Male	61	Left amputation	Left index finger	1	1	2	Very good
7	Male	65	Cut on step	Right little finger	2	0	2	Very good
8	Female	23	Laceration	Left little finger	1	0	1	Good
9	Male	44	Infected thumb	Right thumb	6	6	1	Good
10	Female	63	Crush injury	Left ring finger and middle finger	7	2	3	Good
11	Male	26	Crush injury	Left index finger	6	1	3	Poor
12	Male	64	Dog bite	Right middle finger	1	6	3	Good
13	Male	10	Crush injury	Left middle finger	6	2	2	Poor
14	Male	35	Burns	Right index and middle finger	7	9	1	Poor
15	Female	52	Laceration	Left index finger	2	0	4	Poor
16	Male	64	Laceration	Right index finger	0	0	1	Poor
17	Female	71	Laceration	Left index finger	9	0	1	Poor
18	Female	57	Dog bite	Right ring finger	4	0	1	Very poor
19	Female	51	Laceration	Right ring finger	5	4	2	Poor
Mean		46					2 days	

Table 2. Polymeric dressing.

Case No	Sex	Age	Type of injury	Location of wound	Pain score on 1st change	Pain score on 2nd change	Wear time — in days	Patient rating of dressing
1	Female	82	Laceration	Left little finger	10	0	4	Very good
2	Male	24	Laceration	Right little finger	2	0	4	Very good
3	Male	12	Infected finger	Right middle finger	3	1	6	Very good
4	Female	31	Infected finger	Left thumb	9	0	3	Very good
5	Female	58	Crush injury	Right thumb	5	5	6	Good
6	Male	44	Crush injury	Left thumb	8	6	3	Very good
7	Male	59	Laceration	Right index finger	4	2	6	Good
8	Male	67	Laceration	Left thumb	6	4	4	Good
9	Male	36	Laceration	Left middle finger	5	0	4	Good
10	Male	30	Laceration	Left index finger	4	0	2	Good
11	Male	49	Crush injury	Left index finger	5	0	2	Very good
12	Male	55	Laceration	Left thumb	5	0	6	Very good
13	Male	69	Crush injury	Left index finger	7	4	2	Very good
14	Female	55	Laceration	Right index finger	3	0	2	Very good
15	Male	73	Crush injury	Left middle finger	5	2	2	Very good
16	Male	67	Burn	Right three fingers	8	8	3	Very good
17	Male	72	Laceration	Right ring finger	4	2	2	Very good
18	Male	68	Crush injury	Right little finger	5	2	4	Good
19	Male	66	Laceration	Left middle finger	6	1	2	Very good
20	Male	55	Crush injury	Right middle ring finger	0	0	4	Very good
Mean	Male	107					3.6 days	

wear time was 2–6 days (mean = 3.5 days); (*Table 2*). Seven of the dressing changes were performed by hospital nursing staff, five by practice nurses and eight patients changed the dressing themselves. All of the patients using the PM dressing stated it was good or very good, was comfortable, conformable, and gave protection to the wound. All patients in the PM group reported that they had good finger mobility. With regards to quality of life in this group, patients were able to function as normal and the dressing allowed them to shower easily.

DISCUSSION

The patients' diaries provided a valuable insight into the pain experience of finger injuries and quality of life. Both groups had similar finger injuries. The PM dressing patients were older than the SD group. Neither group experienced a loss of sleep due to their finger injuries. More medication was taken by the PM group in the 14 days than in the SD group, but it was not statically significant. The mean wear time in the SD group was 2 days and slightly longer in the PM at 3.6 days. The SD fell off after 1 day in eight of the patients after application and, therefore, more frequent dressing changes were performed.

The cost of the SD is £3.75 and the PM is £2.50; therefore, the PM is more cost effective. Cost effectiveness of the dressing involves not only the cost of the dressing, but also the time it takes to remove the dressing, cleanse the wound and reapply the dressing (Panca et al, 2013).

Patient outcomes in the PM dressing group showed that the dressing removed easily and patients were very comfortable and valued that the dressing allowed them to function normally. The PM dressing provides a cost-effective dressing with good patient outcomes.

Nurses compared the SD they used to manage these wounds against the PolyMem finger dressing and they were impressed with the ease of application and removal without having to soak the dressing off. They also noted there was no pain for the patient on removal of the PolyMem finger dressing.

CONCLUSION AND RECOMMENDATION

The use of dairies provided a valuable insight into the quality of life of patients living with trauma-induced finger injuries. The experience of pain, particularly in sensitive areas, such as fingertips and injuries with exposed nerve endings, was worth exploring in this evaluation. Davies and White (2011) demonstrated the unique properties of the PM dressing in reducing somatic pain. Overall, the PM dressing was less painful at day 8, compared with the SD.

The patients' pain levels at dressing changes need to be considered and a dressing that helps to reduce pain to the lowest level possible should be used. The results of this evaluation can be used to develop a best practice guideline for finger injuries. The PolyMem finger dressing delivers the important requirements of a finger dressing in that it maintains finger mobility and enhances the quality of life by enabling patients to have a daily shower. The nurses who completed the dressing changes also found that the PolyMem dressing was easy to apply and remove, which reduced the pain for patients. Therefore, PolyMem finger dressings would be a valuable addition to the dressings available for finger traumas. WUK

REFERENCES

Acton C (2008) Reducing pain during wound dressings. *Wound Essentials* 3: 114–22

Baldwin CM, Griffith KA, Nieto J et al (2001) The association of sleep-disordered breathing and sleep symptoms with quality of life in the Sleep Heart Health Study. *Sleep* 24: 96–105

Beitz AJ, Newman A, Kahn AR, Ruggles T, Eikmejer L (2004) A polymeric membrane dressing with antinociceptive properties: analysis with a rodent model of stab wound secondary hyperalgesia. *J Pain* 5(1): 38–47

Bell C, McCarthy G (2010) The assessment and treatment of wound pain at dressing change. *Br J Nurs* 19(11): S4–S10

Benbow M (2010) Managing wound pain: is there an ideal dressing? *Br J Nurs* 19 (20): 1273–4

Benskin L (2006) *Crush injury treated with PolyMeric Membrane dressings until complete wound closure.* Presented at: 19th annual Symposium on Advanced Wound Care (poster #32), San Antonio, USA, 30 April—2 May

Cheung K, Hatchell A, Thoma A (2013) Approach to traumatic hand injuries for primary care physicians. *Can Fam Physician* 59(6): 616–8

Cole-King A, Harding KG (2001) Psychological factors and delayed healing in chronic wounds. *Psychosom Med* 63: 216–20

Davies SL, White RJ (2011) Defining a holistic pain-relieving approach to wound care via a drug free polymeric membrane dressing. *J Wound Care* 20(5): 250, 252, 254 passim

Ebrecht M, Hextall J, Kirtley LG et al (2004) Perceived stress and cortisol levels predict speed of wound healing in healthy male adults. *Psychoneuroendocrinology* 29(6): 798–809

Edwards J (2013) Dealing with wound-related pain at dressing change. *Journal of Community Nursing* 27(4): 36–42

Finlay AY, Khan GK (1994) Dermatology Life Quality Index (DLQI). Available at: http://bit.ly/Uqsvcb (accessed 10 June 2014)

Fleck CA (2007) Managing wound pain today and in the future. *Adv Skin Wound Care* 20(3): 138, 141–2, 145

Foresman PA, Ethridge CA, Rodeheaver GA (1991) *Wound Healing Evaluation on Partial-Thickness Rat Wounds.* Presented at: Symposium on Advances in Skin and Wound Care. Annual Meeting.

Hamilton NA, Gallagher MW, Preacher KJ et al (2007) Insomnia and well-being. *J Consult Clin Psychol* 75(6): 939–46

Hayden JK, Cole BJ (2003) The effectiveness of a pain wrap compared to a standard dressing on the reduction of post-operative morbidity following routine knee arthroscopy: A prospective randomized single blind study. *Orthopedics* 26(1): 59–63

International Association for the Study of Pain (2004) *Desirable*

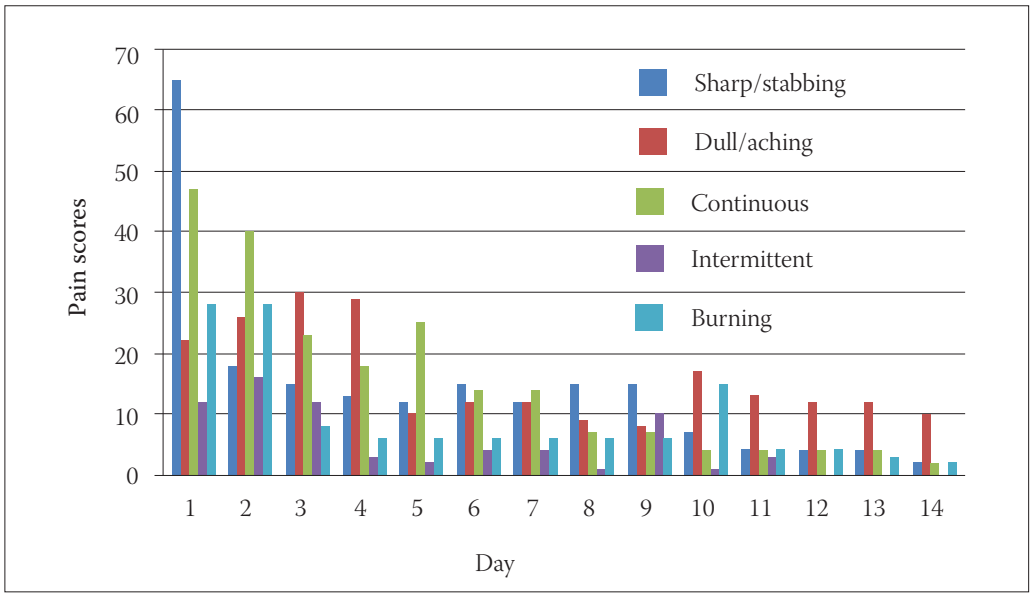

Figure 5. Accumulated descriptive score of patients on the standard dressing.

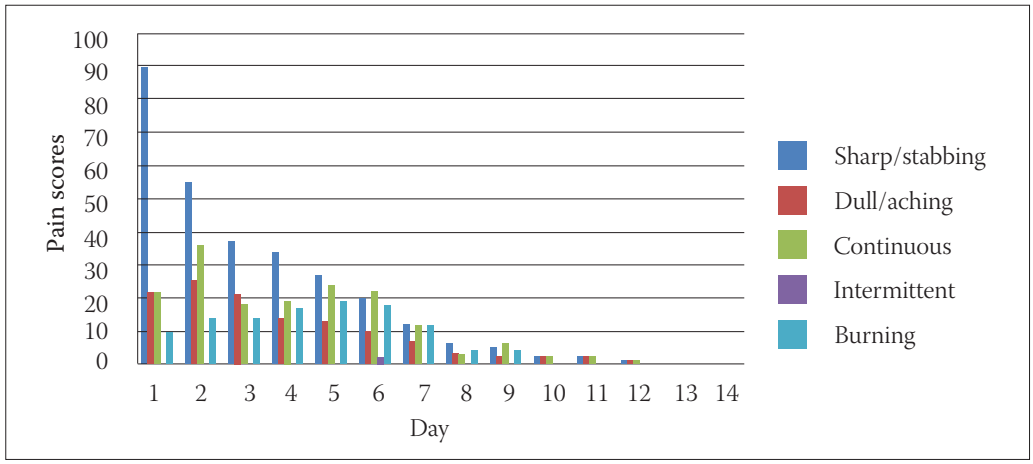

Figure 6. Accumulated descriptive scores of patients of the Polymeric membrane dressing.

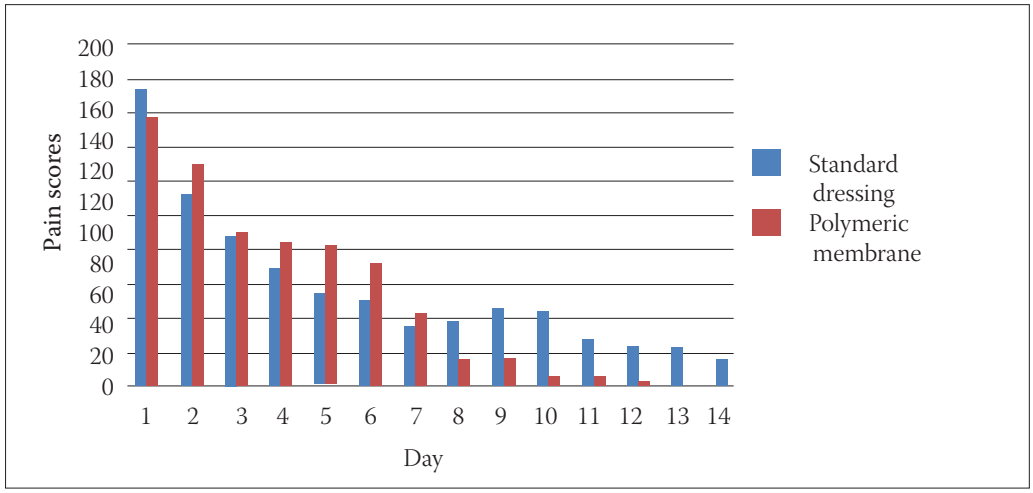

Figure 7. Accumulated overall pain scores for each dressing.

Characteristics for Pain Treatment Facilities. Available at: http://bit.ly/1kWsmYt (assessed 10.06.2014)

Jones M (2007) Repair of minor wounds. *Practice Nurse* 33(12): 31–4

Katz DA, McHorney CA (2002) The relationship between insomnia and health-related quality of life in patients with chronic illness. *J Fam Pract* 51(3): 229–35

Leegaard M, Fagermoen MS (2008) Women's descriptions of postoperative pain and pain management after discharge from cardiac surgery. *J Clin Nurs* 17(15): 2051–60

McGuire L, Heffner K, Glaser R, Needleman B, Malarkey W, Dickinson S et al (2006) Pain and wound healing in surgical patients. *Ann Behav Med* 31(2): 165–72

Oetgen MO, Dodds SD (2007) Non-operative treatment of common finger injuries. *Curr Rev Musculoskelet Med* 1(12): 97–102

Panca M, Cutting K, Guest JF (2013) Clinical and cost-effectiveness of absorbent dressings in the treatment of highly exuding VLUs. *J Wound Care* 22(3): 109-10, 112-8

Raymond I, Nielsen TA, Lavigne G et al (2001) Quality of sleep and its daily relationship to pain intensity in hospitalized adult burn patients. *Pain* 92(3): 381–88

Reid KJ, Martinovich Z, Finkel S et al (2006) Sleep: A marker of physical and mental health in the elderly. *Am J Geriatr Psychiatry* 14(10): 860–66

Richardson C, Upton D (2011) Managing pain and stress in wound care. *Wounds UK* 7(4): 100–7

Royal Society for the Prevention of Accidents (2013) *Accidents to Children.* Available at: http://bit.ly/1qmH8Hs (assessed 10.06.2014)

Scott A (2013) Involving patients in the monitoring of radiotherapy-induced skin reactions. *Journal of Community Nursing* 27(5): 16–22

Solowiej K, Upton D (2012) Painful dressing changes for chronic wounds: assessment and management. *Br J Nurs* 21(20): 20, 22, 24–5

Upton D, Solowiej K (2010) Pain and stress as contributors to delayed wound healing. *Wound Practice and Research* 18(3): 114–22

Upton D, Andrews A (2013) Sleep disruption in patients with chronic leg ulcers. *J Wound Care* 22(8): 389–94

Weichman KE, Wilson SC, Samra F et al (2013) Treatment and outcomes of finger injuries at large metropolitan public hospital. *Plast Reconstr Surg* 131(1): 107–12

White R (2008) A Multinational Survey of the assessment of pain when removing dressings. *Wounds UK* 4(1): 14–22

Wong D, Baker C (1998) Pain in children: comparison of assessment scales. *Pediatric Nurse* 14(1): 9–17

Woo KY, Harding K, Price P, Sibbald RG (2008) Minimising wound-related pain at dressing change: evidence-informed practice. *Int Wound J* 5(2): 144–57

Woo K (2010) Wound related pain: anxiety stress and wound healing. *Wounds UK* 6(4): 92–8

World Health Organization (1986) *Analgesic ladder for Treating Cancer Pain.* Available at: http://bit.ly/1i5HQHg (assessed 10.06.2014)

World Union of Wound Healing Societies (2004) *Principles of Best Practice: Minimising Pain at Wound Dressing-Related Procedures. A Consensus Document.* Available at: http://bit.ly/1uQeiSa (acessed 10.06.2014)