

Stress, social support and coping with a diabetic foot ulcer

Alexandra Bishop

Article points

1. Numerous models exist for assessing stress: each has its limitations.
2. Psychological stress can trigger physiological responses, including impairment of wound healing.
3. Social support may be positive or negative depending upon the relationship.
4. Coping strategies vary; those utilised often depend upon previous experiences.
5. Clinicians need be aware of the psychological issues surrounding diabetic foot ulcers for holistic care.

Key words

- Stress
- Wound healing
- Social support
- Coping strategies

Alexandra Bishop is a Hyperbaric Research Nurse at the Diving Diseases Research Centre, Hyperbaric Medical Centre, Plymouth. This paper was written as part of a PGDip/MSc in Wound Healing and Tissue Repair at the Wound Healing Research Unit, Cardiff University.

In order to provide holistic care, it is important that practitioners not only understand the biological and physiological aspects of the disease, illness or injury, but also the psychosocial issues affecting the individual. Using a case example, stress, social support and coping will be investigated with the aim of developing an understanding of the wider factors associated with diabetic foot ulcers.

Mr B, a 50-year-old man, was diagnosed with diabetes 11 years ago. He developed a diabetic foot ulcer (DFU) that failed to heal and 5 months after its development, an amputation of his left hallux was planned owing to the development of osteomyelitis. Prior to his DFU, Mr B was a self-employed truck driver. However, owing to the ulcer and its treatment, he has been unable to work and has been struggling to claim sick pay. At this time, Mr B was also going through the divorce court where his wife was contesting his claim to half their assets. Consequently, Mr B was residing with his elderly mother. It was evident at his wound clinic appointments that Mr B was very low in mood and frequently became tearful. Clearly, he has many issues requiring consideration, including his non-healing DFU, divorce and the loss of his job and income.

Ways of looking at stress

Numerous models have been developed for assessing stress, and their use provides a means of understanding the individual's perspective. Selye (1956), one of the first

to describe stress, discussed the General Adaptation Syndrome. He suggested this occurs in three stages:

- alarm reaction
- resistance
- exhaustion.

Selye (1956) believed that regardless of the source of stress, this physiological response pattern proceeds.

Ten years later, Lazarus (1966) described a model of stress contrived of two sections:

- stress appraisal
- coping mechanisms.

In contrast to Selye's, this model considers the interaction between individual and environment. Rather than, as Selye's model suggests, Mr B definitely reacting in a set manner to the stressors placed upon him, Lazarus' model suggests that the severity of his reaction will depend upon his perception of the stress.

Holmes and Rahe (1967) developed the Social Readjustment Rating Scale (SRRS). Scores were calculated for various life events in order to rate the relative degree of necessary readjustment. Not all listed events are negative, but all are considered

to require some form of readjustment that leads to stress. Mr B would probably score moderately high on the SRRS and this could partly explain why his foot ulcer and subsequent bone infection occurred when it did (Holmes and Rahe, 1967). However, there have been criticisms of this scale. It is difficult to distinguish between some of the listed life events as they are interlinked. Krantz et al (1985) suggested that if the frequency of all events is considered alone, unique interactions might be missed. As with the General Adaptation Syndrome, the SRRS assumes that all individuals perceive equal levels of stress.

It is important to note that there does not appear to be any one model that best applies to every individual. However, Lazarus' model appears to best consider individuality.

Effects of stress on health and wounds

The rapid stress response, commonly known as flight or fight, can be triggered by physical or psychological dangers or by emotional distress (Krantz et al, 1985). While the resulting increase in hormones, amino acids and glucose may be valuable when a physical threat is present, this arousal can be counterproductive when a physical response is not required (Niven, 1989).

During the body's slow stress response, the enzymes released remain functioning for longer than the hormones seen in the rapid response (Selye, 1956). Krantz et al (1985) explained that individuals demonstrate differences in physiological responses to stressors and these responses depend upon both biological predispositions and perceived ability to cope. This relates to some of the stress models discussed earlier, most particularly Lazarus' (1966) model.

A change in someone's quality of life (QoL) can be a stressor. Brod (1998), Willrich et al (2005) and Searle et al (2005) are among the few who have published work on diabetic ulcers and QoL. Similar key themes emerged from each of the studies, some of which are highly relevant to Mr B's circumstances. People in this situation expressed concern

about losing their independence and freedom, leading to more stressful days. Prime emotions were fear, anger, frustration and guilt. Mr B certainly experienced these emotions, particularly the latter two. The consistent results in these studies give good understanding of the effect the DFU had on Mr B's psychological stress.

Brod (1998) found that, like Mr B, many study participants were not working owing to their ulcer. For younger individuals, in addition to financial strain, this led to diminished self esteem. In an earlier study on the stress process, Pearlin et al (1981) identified that the economic strain of being unemployed leads to negative effects in other areas of life. So, although not working enabled Mr B to rest his foot as recommended, the impact of this on his psychological state possibly had a greater indirect negative effect on his ulcer.

Additionally, Brod (1998) identifies a cascading effect: one apparently small change can have an overwhelming impact on other aspects of life. Mr B did find some positive benefit to networking with other people with diabetic foot ulcers and their relatives in the informal setting of the hospital sitting room. Indeed, other individuals have commented to the author on the support they gained from sharing their concerns with others in similar situations just from using the same sitting area on a regular basis.

Few studies have been conducted to show the effect of stress on wound healing at a biological level. Kiecolt-Glaser et al (1995) compared the effect of stress on cytokine production and healing rate in punch biopsy wounds created on 13 women under stress as caregivers and 13 female controls. They found that not only did complete wound healing take longer in the caregivers, but they also produced significantly less interleukin (IL)-1 β .

Glaser et al (1999) furthered this study in order to demonstrate that psychological stress has measurable effects within a wound. Health-related behaviours were assessed and stress was measured using four scales.

Page points

1. Individuals demonstrate differences in physiological responses to stressors and these responses depend upon both biological predispositions and perceived ability to cope.
2. People with diabetic ulcers express concern about losing their independence and freedom, leading to more stressful days. Prime emotions were fear, anger, frustration and guilt.
3. The economic strain of being unemployed leads to negative effects in other areas of life.
4. One apparently small change can have an overwhelming impact on other aspects of life.

Page points

1. Stress can have measurable negative consequences within a wound.
2. Common opinion is that individuals cope better with stress when they have social support.
3. Emotional support is not provided by all of an individual's social relationships, but primarily by those with certain qualities such as trust and intimacy.
4. An individual may perceive support received differently from actual support and not all relationships provide positive social support.

They reported that lower levels of IL-1 α and IL-8 were found in participants who reported more stress and a slightly higher number of adverse life events, leading to their conclusion that stress can have measurable negative consequences within a wound.

While both studies provide further weight for the belief that psychological stress affects wound healing, they must be taken in context. They relate to acute wounds, rather than chronic (as is Mr B's). In addition, all participants were female. The fact that subjects in Glaser et al's (1999) study responded to adverts offering a monetary reward for participation must also be acknowledged. However, increased levels of stress do appear to hinder healing, which is relevant to Mr B's circumstances. Models such as the General Adaptation Syndrome and the SRSS, which suggest that all individuals perceive and react to stress in a similar manner, would indicate that these two pieces of research are highly relevant to anyone with a wound, including Mr B.

Cole-King and Harding (2001) studied chronic leg ulcer healing and suggested that the biochemical and endocrine alterations occurring in individuals experiencing stress could be similar to that in those with anxiety or depression. They had a high response rate (90%) when they provided participants with chronic wounds with Hospital Anxiety and Depression (HAD) questionnaires. Wound healing rates were compared over 3 months with initial HAD scores. Of the 53 who took part, 16 were diagnosed with anxiety on the HAD scale and all but one of those had slow wound healing. Thirteen individuals had depression scores and all displayed delayed healing. None of those who were healing well and only one who was healing moderately well had anxiety or depression scores. Thus, being depressed or in a state of anxiety might be associated with adherence to treatment and can affect wound healing in a similar way to stress.

This study by Cole-King and Harding (2001) appears more relevant to Mr B as he has a chronic ulcer and may have a high HAD score considering his current life issues. Mr B

was not tested on the HAD scale as this is not part of routine care and would have required ethical approval.

Social support

Common opinion is that individuals cope better with stress when they have social support (Schaefer et al, 1981). There are numerous ways of measuring social support. Three categories have been described (Cohen, 1988):

- social networks
- resources (quality and quantity)
- social relationships.

Social support can come from a variety of sources, including family, friends, work, hobbies and support groups (Cohen and Wills, 1985).

Cohen (1988) describes two measures of social support:

- Structural measures: these look at interconnections between social ties.
- Functional measures: these assess whether or not relationships perform particular functions (for example, provide affection).

Pearlin et al (1981) suggested that emotional support is not provided by all of an individual's social relationships, but primarily by those with certain qualities such as trust and intimacy. It is important to note that an individual may perceive support received differently from actual support (Schaefer et al, 1981) and that not all relationships provide positive social support. Actual support is linked to structural measures of support while perceived support could be determined by functional measures. It may be a person's perception of the support that determines how it impacts on their stress levels.

Two main models explain how social support affects health (Cohen and Wills, 1985). The first is the direct-effect model and the second is the buffering model.

- The direct-effect model suggests that social support has a beneficial effect irrespective of whether or not a person is under stress.
- The buffering model proposes that the support primarily benefits those under stress.

Page points

1. Participants in highly hostile relationships were slower to heal than the others at both visits and their production of IL-6, tumour necrosis factor- β and IL-1 α was lower following the conflict task than after the supportive task.
2. Coping can be viewed as a process whereby individuals try to manage the perceived difference between the demands they are under and the resources available to them.
3. The crisis theory is a process where an individual deals with a stressful event by adapting coping mechanisms.
4. Studies have indicated that individuals often use more than one coping strategy and previous experiences may affect the individual's coping mechanisms.

Cohen and Wills (1985) reviewed studies on both models and concluded that there is evidence consistent with each, depending upon the measures used for support.

To address the lack of research on social support and chronic wounds, Keeling et al (1997) conducted a study in people with leg ulcers and DFUs. There were only 15 participants per group and they found no significant differences between the two groups. Most study participants believed that they received little social support. The average age of the studied individuals was 13 years older than Mr B, but results may still aid the understanding of Mr B's experiences.

Mr B's social support prior to his attendance at the wound clinic is unknown; during a standard assessment, social circumstances are discussed but detailed conversations about social support are not possible owing to time restrictions. However, it is clear that some support has been lost over the last few months. Firstly, he has separated from his wife. Kiecolt-Glaser et al (2005) investigated healthy married couples to determine whether or not hostile marital interactions could affect healing in blister wounds. The couples were observed during two separate interactions. The first involved a supportive discussion and the second (at a separate visit) involved a conflict discussion. Results showed that those participants in highly hostile relationships were slower to heal than the others at both visits and also their production of IL-6, tumour necrosis factor- β and IL-1 α was lower following the conflict task than after the supportive task. Kiecolt-Glaser et al (2005) suggest that their results may underestimate the health impact of marital difficulties – couples will argue more freely and for longer in their own environment. Although Mr B is separated from his wife, he is still involved in hostile interactions in the divorce court.

Mr B has also lost other areas of social support. He seemed to have enjoyed work as a driver, which would have provided beneficial social networks and relationships. Mr B now also has restricted mobility, which will continue for a period following his

toe amputation. This leads to a reduction in social integration and his current social support appears to consist of his mother and the wound clinic.

Coping

Keeling et al (1997) explained that coping can be viewed as a process whereby individuals try to manage the perceived difference between the demands they are under and the resources available to them. Coping methods vary and Barrett and Teare (2000) suggest that an individual's holistic assessment should include a focus on coping strategies.

The crisis theory is a process where an individual deals with a stressful event by adapting coping mechanisms. Niven (1989) suggests that this process can influence future perceptions of stress and coping methods selected. It has been suggested that there are the following five main adaptive tasks within the crisis theory (Niven, 1989).

- Establishing the significance of the situation.
- Confronting reality.
- Maintaining good relationships with family and friends.
- Sustaining emotional balance.
- Maintaining an acceptable self image.

Mr B was experiencing a number of stressors. This may have made these adaptive tasks difficult to achieve when appraising so many life events.

Coping strategies can involve dealing with a problem head on, or avoidance techniques. They can also be classified as problem or emotion focused (Keeling et al 1997). Studies have indicated that individuals often use more than one coping strategy and previous experiences may affect the individual's coping mechanisms (Barrett and Teare, 2000). Looking at Mr B's case retrospectively, he was trying to deal with the problems head on. He was certainly emotion focused (obvious from his tearfulness) but was also using some problem-focused strategies.

Hopkins (2004) investigated the coping strategies adopted by five people with chronic leg ulcers using unstructured interviews and

diary entries. All participants demonstrated different ways of coping with their ulcers, but all had accepted that the ulcer was part of their life and some considered how the situation could be worse to lift their mood. Walshe (1995) conducted a study on nine elderly individuals with leg ulcers and identified four coping strategies:

- feeling healthy
- altered expectation
- comparison with others
- positive thinking.

Although small samples were used in both of the above studies, the coping trends identified are worth consideration, particularly owing to the lack of research in the area of coping and chronic wounds. Mr B may have been able to cope by accepting the ulcer, had various other stressors been absent. The impending amputation also meant that any acceptance he might have developed would have to be redirected to the loss of his toe. It was implied by the interactions that in Mr B's view, this may well have been the 'worse' with which he was comparing. His coping may well have differed from the methods adopted by participants in the study by Walshe (1995) as he is not elderly.

Outcomes

Mr B was referred for hyperbaric oxygen therapy for treatment of his non-healing ulcer with probable osteomyelitis. His dressing was changed at the diabetes centre on a weekly basis with Mr B's district nurse team continuing dressing changes at other times.

Upon review at the diabetic foot clinic, it was decided that Mr B should undergo a ray amputation. Four days later, during an appointment for a dressing change, Mr B admitted that he was struggling to cope with the various issues affecting him at the time. He had always discussed his problems and been tearful, but on this occasion he broke down quite substantially and confessed that everything was getting on top of him. This was dealt with mainly by listening. Unfortunately, we were unable to do anything to help him overcome his financial concerns

and those relating to his divorce. We were, however, able to offer time for him to talk and attempted to encourage him to discuss his concerns with other people in similar circumstances.

Mr B underwent amputation surgery and returned for further hyperbaric oxygen therapy to aid in the healing of the large open wound. Following 4 weeks of hyperbaric therapy, Mr B continued to visit the centre for dressing changes and wound assessment on a weekly basis. As before, his district nurse team continued with dressings at other times.

Mr B continued to struggle with the stressful issues affecting him for a short time after his surgery. Approximately 50 weeks after his surgery, Mr B was discharged from the centre with a healed wound.

Conclusion

Keeling et al (1997) suggested that social support, stress and coping are the most important areas investigated by health psychologists, especially when explored in association with chronic conditions. There are numerous stress models available, but there appears to be no consensus on which is the most relevant to people with chronic wounds. It seems clear from the literature that individuals perceive stress differently and also cope in various ways. Research shows that lowered QoL is a common stressor for individuals with chronic wounds, such as DFUs. Mr B's case supports the literature in that the development of a wound can affect other areas of life and lead to stress. Research on the effect of stress on wound healing at a biological level is limited, but convincing, particularly on cytokine production and healing rate.

Social support appears to have an affect on stress and coping, although there is no agreement on whether this is a direct or buffering effect. There are a number of different coping strategies that people utilise in stressful situations and these can be influenced by a variety of factors.

It is essential that clinicians are aware of the importance of psychosocial issues in

Page points

1. There are numerous stress models available, some more adaptable than others, but there appears to be no consensus on which is the most relevant to people with chronic wounds.
2. Research shows that lowered quality of life is a common stressor for individuals with chronic wounds, such as diabetic foot ulcers.
3. It is essential that clinicians are aware of the importance of psychosocial issues in order that optimum care can be provided for the individual.

Page points

1. Time needs to be made for psychosocial assessment and any potential issues raised from that assessment need to be discussed and plans made.
2. Individuals should be encouraged to talk about problems seemingly unrelated to their wounds and spend time talking to one another in patient lounges when they attend for appointments.

order that optimum care can be provided for the individual. The most important thing is for clinicians to be aware of these issues and how they can affect outcome. They also need to be aware of other members of the multidisciplinary team and what support is available from them. Time needs to be reserved for psychosocial assessment and any potential issues raised from that assessment need to be discussed and plans made. However, it is also important to encourage people to take responsibility themselves. Individuals should be encouraged to talk about problems seemingly unrelated to their wounds and spend time talking to one another in patient lounges when they attend for appointments. ■

Barrett CM, Teare JA (2000) Quality of life in leg ulcer assessment: patients' coping mechanisms. *British Journal of Community Nursing* 5: 530-40

Brod M (1998) Quality of life issues in patients with diabetes and lower extremity ulcers: patients and care givers. *Quality of Life Research* 7: 365-72

Cohen S (1988) Psychosocial models of the role of social support in the etiology of physical disease. *Health Psychology* 7: 269-97

Cohen S, Wills TA (1985) Stress, social support, and the buffering hypothesis. *Psychological Bulletin* 98: 310-57

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

Glaser R, Kiecolt-Glaser JK, Marucha PT et al (1999) Stress-related changes in proinflammatory cytokine production in wounds. *Archives of General Psychiatry*. 56: 450-6

Holmes TH, Rahe RH (1967) The Social Readjustment Rating Scale. *Journal of Psychosomatic Research* 11: 213-8

Hopkins A (2004) Disrupted lives: investigating coping strategies for non-healing leg ulcers. *British Journal of Nursing* 13: 556-63

Keeling D, Price P, Jones E, Harding KG (1997) Social support for elderly patients with chronic wounds. *Journal of Wound Care* 6: 389-91

Kiecolt-Glaser JK, Loving TJ, Stowell JR et al (2005) Hostile marital interactions, proinflammatory cytokine production, and wound healing. *Archives of General Psychiatry* 62: 1377-84

Kiecolt-Glaser JK, Marucha PT, Malarkey WB et al (1995) Slowing of wound healing by psychological stress. *The Lancet* 346: 1194-6

Krantz DS, Grunberg NE, Baum A (1985) Health psychology. *Annual Review of Psychology* 36: 349-83

Lazarus R S (1966) *Psychological Stress and the Coping Process*. McGraw-Hill, New York

Niven N (1989) *Health Psychology: An introduction for nurses and other health care professionals*. Churchill Livingstone, Oxford

Pearlin LI, Lieberman MA, Menaghan EG, Mullan JT (1981) The stress process. *Journal of Health and Social Behaviour* 22: 337-56

Schaefer C, Coyne JC, Lazarus RS (1981) The health related functions of social support. *Journal of Behavioural Medicine* 4: 381-406

Searle A, Campbell R, Tallon D et al (2005) A Qualitative Approach to Understanding the Experience of Ulceration and Healing in the Diabetic Foot: Patient and Podiatrist Perspective. *Wounds* 17: 16-26

Selye H (1956) *The Stress of Life*. McGraw-Hill, New York

Walshe C (1995) Living with a venous leg ulcer: a descriptive study of patients' experiences. *Journal of Advanced Nursing* 22: 1092-100

Willrich A, Pinzur M, McNeil M et al (2005) Health related quality of life, cognitive function, and depression in diabetic patients with foot ulcer or amputation. A preliminary study. *Foot & Ankle International* 26: 128-34