

# Diabetic Foot Study Group: Diabetes, pain, and the consequences

*Dominic Upton, Clifford Richardson, Kristien Van Acker, Abbye Andrews, Kate Springett*

**This report is a summary of the *Many Aspects of Pain, from the Physiological to the Biopsychosocial* and *Pain in Diabetic Foot Ulcers: A Clinician and Patient Perspective* sessions held on Friday 28 September and Sunday 30 September 2012, at the Diabetic Foot Study Group's 10<sup>th</sup> Scientific Meeting in Berlin-Potsdam, Germany.**

What is the diabetic patient's experience of pain with regards to diabetic foot ulcers, and why is this important to clinicians? These questions were answered, and important issues raised, at the Diabetic Foot Study Group's 10<sup>th</sup> Scientific Meeting, held between 28–30 September 2012 in Berlin-Potsdam, Germany. Stimulating presentations were delivered by Dr Clifford Richardson, University of Manchester, and Professor Dominic Upton, University of Worcester, in symposia sponsored by Mölnlycke Health Care, chaired by Dr Kristien Van Acker, Centre de Santé des Fagnes, a diabetologist specialising in diabetic foot disease.

Due to the high incidence of diabetic neuropathy in patients with diabetic foot ulcers (Pirart, 1977; Tesfaye et al, 2010;

Boulton and Vileikyte, 2011), it is often assumed that patients do not experience pain. However, as Dr Richardson asserted at the symposium, neuropathy can involve both numbness and pain, which may even occur simultaneously in some patients, giving a feeling of "painful numbness".

Pain is, in fact, commonly experienced by people with diabetes, particularly on walking or standing (Ribu et al, 2006), and it is reported to be a "hidden burden" (Bradbury and Price, 2011a; 2011b). People with painful diabetic neuropathy describe pain as "aching", "throbbing", and "tender" sensations (Bradbury and Price, 2011c). The management of painful diabetic neuropathy requires a person-centred approach, taking comorbidities into account (Teskaye et al, 2011). Given that pain can impact on a patient's experience of stress, anxiety, and quality of life, in addition to its effect on wound healing (Solowiej et al, 2009), it is important that clinicians acknowledge the pain experience and seek to reduce pain, particularly during dressing change and treatment.

The patient experience of pain was expertly addressed at the symposium,

with Dr Richardson first highlighting the physiological and biopsychosocial aspects of pain, before Professor Upton presented the findings of a recent study into patients' experience of pain and how perceptions of this pain differ between patients and clinicians.

Finally, a reflective discussion session followed, focussing on the realities of differing perceptions about the pain experience, and the implications for assessment

and practice for those involved in treating patients with diabetic foot ulcers.

## **The many aspects of pain, from the physiological to the biopsychosocial (Dr Richardson)**

Physiologically, pain arises from neuropathy due to a collection of events that occur peripherally and centrally (within the spinal cord and the brain). Peripheral nerve damage leads to the accumulation of hyper-excitability sodium channels at the point of damage (Spruce et al, 2003; Veves et al, 2008). Ectopic discharges from these channels sensitise the dorsal horn and the dorsal root ganglion. Cross-communication between nerves can occur along with an

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### **Authors**

Dominic Upton is Associate Head of the Institute of Health and Society, University of Worcester, Worcester; Clifford Richardson is Lecturer in Nursing, School of Nursing, Midwifery and Social Work, University of Manchester, Manchester; Kristien Van Acker is Diabetologist, Centre de Santé des Fagnes, Chimay, Belgium; Abbye Andrews is Research Assistant, Department of Psychological Sciences, Institute of Health and Society, University of Worcester, Worcester; Kate Springett is Head of Department of Allied Health Professions, Canterbury Christ Church University, Canterbury.

excessive release of glutamate, causing membrane depolarisation and synaptic potentiation (Svendsen et al, 1998; Stanfa and Dickenson, 1999), and Substance P, which can contribute to the development of allodynia in the area of original nerve damage (Quattrini et al, 2007).

Synaptic potentiation triggers changes higher up in the central nervous system. In painful diabetic neuropathy, there are changes in microvascular perfusion and variations in pain-processing metabolites, which add to the risk of developing allodynia and hyperalgesia in the foot. Despite the likelihood of nerves being badly damaged by diabetes, the high risk of allodynia and hyperalgesia through these mechanisms leads to the potential for painful numbness.

Although there are clear physical pain responses in patients with diabetic foot ulcers, Dr Richardson reported that these responses are not the same for everyone. This appears to be due, at least in part, to biopsychosocial aspects, such as cultural differences or psychological traits. For example, there are differences in the reports of pain experienced by “stoics” and “catastrophisers”, with people exhibiting the latter trait reporting greater levels of pain (Severeijns et al, 2001; Sullivan et al, 2001). Stoics, in contrast, may report little pain. Many other social and cultural factors are likely to influence individual perceptions of pain, although there are few firm conclusions.

Individual differences in the pain experiences of people with diabetic foot ulcers, and in the way people report pain, may be confusing to clinicians. The assessment of a patient’s level of pain is very important, not only for those who experience high levels of pain, but also for those who do not. Bearing in mind

the stoics and catastrophisers, and those patients who do not want to “cause trouble”, there is a risk that those who do not report pain may be monitored less closely by the clinician than those who do.

As Dr Richardson highlighted, these patients actually require just as much attention, if not more, than those reporting high levels of pain. This is because patients who report little pain are at greater risk of trauma that could go unreported. These traumas may occur as a result of inappropriate dressings, and they may cause the wound to worsen, become infected, and/or take longer to heal. Similarly, the type of dressing used with the stoic group is just as important as for those who experience high levels of pain.

Dr Richardson’s address highlighted the importance of understanding the pain experience from the patient’s perspective and also of examining the perceptions of clinicians in relation to how much pain their patients experience. These issues were skilfully explored by Professor Upton in the second part of the symposium.

### **Pain in diabetic foot ulcers: A clinician and Patient perspective (Professor Upton)**

In a recent, as yet unpublished, study, Professor Upton and colleagues investigated the experience of pain in patients with diabetic foot ulcers and compared patients’ reports of pain with clinicians’ perceptions of their patients’ pain. The findings have important implications for the practice of clinicians working with diabetic foot ulcer patients.

Whereas previous research comparing clinician and patient perceptions has focussed on other areas, such as mental health or rheumatoid arthritis, Professor Upton explored this issue directly in a diabetic foot ulcer population. An online survey was completed by 97 individuals who had diabetic foot ulcers. A clinician version was also completed by 83 clinicians who had experience of working with people with diabetic foot ulceration. Of these, 94% were podiatrists. Questions posed to both groups centred on how much pain the patient experienced when undertaking different activities or at different parts of the day.

One of Professor Upton’s key findings was that clinicians both underestimated and overestimated the level of pain that patients experienced during different activities. For example, clinicians underestimated the amount of pain patients experienced when trying on footwear, with none of them expressing that patients “always” experienced this, in comparison to 14% of patients. Similarly, while 21% of patients reported “always” experiencing pain when walking, only 6% of clinicians reported this.

However, clinicians overestimated the amount of pain patients experienced while sitting with their legs raised, with 66% expressing that patients “sometimes” experienced this, while 47% of patients reported “never” or “rarely” experiencing pain at this time.

The patients in this study reported experiencing both pain and stress due to their diabetic foot ulcers and due to dressing change. “Moderate” or “severe” pain was reported by 48% of patients. Patients and clinicians expressed some agreement when asked whether

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patients adhered to, or increased, their painkiller dose prior to a dressing change to manage pain. Twenty-one per cent of patients expressed that they “always” or “frequently” did this, compared with 25% of clinicians. This emphasises that clinicians have some idea of the pain experienced at dressing change and the need for pain relief.

Although 51% of clinicians reported routinely measuring pain, only 38% said they measured pain at dressing change. Dressing change can be very painful for patients, as well as somewhat stressful. In this study, 45% of patients reported experiencing some level of stress when thinking about dressing changes, although only 20% of clinicians believed that patients found this stressful. This has important implications since stress has been found to be associated with reduced immune functioning and delayed wound healing (Vileikyte, 2007; Solowiej et al, 2009; Walburn et al, 2009).

As Upton explained, these findings highlight the importance of assessing both pain and stress reported by patients, particularly at dressing change. Managing painful diabetic neuropathy presents a challenge (Tesfaye et al 2011), and acknowledging the pain from dressing changes can allow the patient to feel better supported by the clinician. Making such assessments an integral part of wound care would enable clinicians to provide the most appropriate forms of treatment and to support patients in minimising their pain and stress levels. This would, in turn, speed up the healing process, thus improving the patient’s quality of life.

Furthermore, as Dr Richardson reported earlier in the symposium, accurate assessments of both are just as important for those who do not report high levels of pain and stress, since clinicians need to be

extra cautious when assessing patients for skin trauma and other conditions that could exacerbate the wound and delay healing.

### Open discussion

Following on from the thought-provoking contributions from Dr Richardson and Professor Upton, delegates at the symposium were invited to discuss the issues raised by the speakers. This was Chaired by Dr Kristien Van Acker, who raised some insightful points.

The majority of the clinicians at the symposium had previously estimated the amount of pain experienced by patients to be relatively low (0–30%). However, many more agreed to assess patients’ levels of pain in future after hearing the two presentations.

It was noted that it is not always possible to identify that a patient is experiencing pain only by observing them. This emphasises the need for some form of assessment that does not rely solely on the clinician’s judgement, but involves the patient. There was some discussion relating to who is best placed to assess the pain – is it the doctor, nurse, or the patient themselves? However, it was generally agreed that an interdisciplinary approach is most effective.

The method by which pain is measured was discussed and it was agreed that a simple visual analogue scale (VAS) would be a useful measure, whereby patients rate their level of pain, from 0 (no pain) to 10 (the worst imaginable pain). Pain scores rated by patients with chronic neuropathy are unlikely to change during treatment.

A potential flaw of using this approach is that patients may rate their level of pain higher in order to receive analgesics; this is something that clinicians have to judge through asking appropriate questions, although this can be difficult.

Measures exist for assessing stress, although a simple VAS would again be useful. It was acknowledged that distracting patients can reduce their focus on pain, thus minimising the pain experienced.

A discussion ensued about the consequences of not minimising patients’ experience of pain. Pain is an immunosuppressant, which can alter the local wound environment and slow the healing process. Differences exist between acute and chronic pain, but pain from both can affect the time taken for a wound to heal. This then impacts the patient’s wellbeing, and economic and practical costs associated with ongoing treatment.

Additionally, some patients with neuropathy can experience high levels of pain, which is often underestimated by clinicians and, consequently, undertreated (Daousi et al, 2004; Van Acker et al, 2009). It is, therefore, important that clinicians look for painful neuropathy in addition to neuropathy without pain. This can be achieved through the use of the DN4 questionnaire (Bouhassira et al, 2005).

Similarly, a discussion took place regarding the consequences of not using appropriate dressings for patients who do not report pain. It is perhaps even more important to utilise atraumatic dressings in people with insensate feet as the potential to damage sensitive tissues when applying and removing dressings is extremely high when pain is absent. Those who do not report pain may still experience skin trauma, so it is essential that clinicians are alert to this.

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Finally, another issue raised was that of patient self-management. Patients can exert some control by changing their own dressings, which may reduce the pain they experience and promote faster wound healing. However, this may be risky in relation to the development of infection or skin trauma, so supervision might be needed.

### Summary

Several important issues were raised during Dr Richardson's and Professor Upton's sessions, as well as from the open discussion that followed. First, we know that people with diabetic foot ulcers do experience pain and many also experience stress in relation to this pain. Second, some people who experience pain, but do not report it (stoics), could be at greater risk of infection and skin trauma as a result of not receiving appropriate information or care.

Others who do not perceive pain, and, therefore, do not report pain, will be at similar risk, due to being unaware of the damage that is being caused. We know that clinicians do not always accurately perceive the amount of pain and stress that a patient experiences, particularly those with neuropathy.

Since the experience of pain and stress can affect the patient's wellbeing and delay wound healing, it is important that clinicians assess and understand the patient's level of pain, so as to identify appropriate approaches and treatments. Pain can be measured using a simple VAS scale, which, despite its limitations, is a quick and easy way of making pain assessment part of clinical practice when working with people with diabetic foot ulcers and other wounds.

The consequences of clinicians failing to assess pain and failing to minimise the experience of pain can include decreased wellbeing of the patient, both physically and psychologically, and delayed wound healing, leading to greater healthcare costs and reduced efficiency in the long term. ■

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Bouhassira D, Attal N, Alchaar H et al (2005) Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4). *Pain* **14**: 29–36

Boulton AJM, Vileikyte L (2011) *Painful Diabetic Neuropathy in Clinical Practice*. Springer, London

Bradbury S, Price PE (2011a) Diabetic foot ulcer pain (part 1): the hidden burden. *EWMA Journal* **11**: 11–22

Bradbury S, Price PE (2011b) Diabetic Foot Ulcer Pain (part 2): the hidden burden. *EWMA Journal* **11**: 25–37

Bradbury S, Price P (2011c) The impact of diabetic foot ulcer pain on patient quality of life. *Wounds UK* **7**: 32–49

Daousi C, MacFarlane IA, Woodward A et al (2004) Chronic painful peripheral neuropathy in an urban community: a controlled comparison of people with and without diabetes. *Diabet Med* **21**: 976–82

Pirart J (1977) Diabetes mellitus and its degenerative complications: a prospective study of 4,400 patients observed between 1947 and 1973 (author's transl). *Diabetes Metab* **3**: 245–56

Quattrini C, Harris ND, Malik RA, Tesfaye S (2007) Impaired skin microvascular reactivity in painful diabetic neuropathy. *Diabetes Care* **30**: 655–9

Ribu L, Rustøen T, Birkeland K et al (2006) The prevalence and occurrence of diabetic foot ulcer pain and its impact on health-related quality of life. *J Pain* **7**: 290–9

Severeijns R, Vlaeyen JW, van den Hout MA, Weber WE (2001) Pain catastrophizing predicts pain intensity, disability, and psychological distress independent of the level of physical impairment. *Clin J Pain* **17**: 165–72

Solowiej K, Mason V, Upton D (2009) Review of the relationship between stress and wound healing: part 1. *J Wound Care* **18**: 357–66

Spruce MC, Potter J, Coppini DV (2003) The pathogenesis and management of painful diabetic neuropathy: a review. *Diabet Med* **20**: 88–98

Stanfa L, Dickenson A (1999) The role of non-N-Methyl-D-Aspartate ionotropic glutamate receptors in the spinal transmission of nociception in normal animals and animals with carrageenan inflammation. *Neuroscience* **93**: 1391–8

Sullivan MJ, Thorn B, Haythornthwaite JA et al (2001) Theoretical perspectives on the relation between catastrophizing and pain. *Clin J Pain* **17**: 52–64

Svendsen F, Tjølsen A, Hole K (1998) AMPA and NMDA receptor dependent spinal LTP after nociceptive tetanic stimulation. *Neuroreport* **9**: 1185–90

Tesfaye S, Boulton AJ, Dyck PJ et al (2010) Diabetic neuropathies: update on definitions, diagnostic criteria, estimation of severity, and treatments. *Diabetes Care* **33**: 2285–93

Tesfaye S, Vileikyte L, Rayman G et al (2011) Painful diabetic peripheral neuropathy: consensus recommendations on diagnosis, assessment and management. *Diabetes Metab Res Rev* **27**: 629–38

Van Acker K, Bouhassira D, De Bacquer D et al (2009) Prevalence and impact on quality of life of peripheral neuropathy with or without neuropathic pain in type 1 and type 2 diabetic patients attending hospital outpatients clinics. *Diabetes Metab* **35**: 206–13

Veves A, Backonja M, Malik RA (2008) Painful diabetic neuropathy: epidemiology, natural history, early diagnosis and treatment options. *Pain Medicine* **9**: 660–74

Vileikyte L (2007). Stress and wound healing. *Clin Dermatol* **25**: 49–55

Walburn J, Vedhara K, Hankins M et al (2009) Psychological stress and wound healing in humans: a systematic review and meta-analysis. *J Psychosom Res* **67**: 253–71