



REVIEW

A Consideration of the Psychological Aspects to Managing Patients with Painful Diabetic Neuropathy: An Insight into Pain Management Services at a Tertiary Centre in the UK

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ABSTRACT

Painful diabetic neuropathy (pDN) is characterised by both sensory and affective disturbances, suggesting a complex bidirectional relationship of neuropathic pain and mood disorders. Data on pDN indicate that neuropathic pain reduces quality of life, including mood and physical and social functioning. Depression and pain coping strategies such as catastrophising and social support predict pain severity. There is a significant and reciprocal relationship between depressed mood and increased pain. The key features of assessing people with neuropathic pain in relation to psychological aspects of their health are discussed in the context of management in a

tertiary pain management centre (The Walton Centre, Liverpool, UK) including cognitive behavioural interventions amongst others to improve the quality of life in patients with pDN. We consider psychological issues as a factor influencing treatment and outcome in patients with pDN.

Keywords: Acceptance and commitment therapy; Anxiety; Cognitive behavioural therapy; Depression; Painful diabetic neuropathy; Pain management programme

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Key Summary Points

Why carry out this study?

pDN can result in severe neuropathic pain which is often be intractable. It has an adverse effect on quality of life and social functioning. Psychological factors play an important role in pain perception.

The key features of evaluating people with neuropathic pain in relation to psychological aspects of their health are discussed in the context of management in a tertiary pain management centre. We discuss cognitive behavioural interventions to improve the quality of life in patients with pDN.

What was learned from the study?

Pain reduction plays only a part of the outcomes in a pain management programme. Quality of life and improvement in overall functioning are key outcomes in psychological interventions.

DIGITAL FEATURES

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INTRODUCTION

It is well documented that pain is a significant problem in primary care and neuropathic pain represents a tremendous challenge worldwide. It affects a huge proportion of the population, 14 million people in England, according to an audit by the British Pain Society [1].

Clearly, only a proportion of these patients have diabetic neuropathy or pain associated with diabetes; however, whatever its aetiology, pain can cause significant demands on the UK National Health Service (NHS) [2]. Diabetic peripheral polyneuropathy (also known as diabetic neuropathy) affects 50% of patients with diabetes [3–5] and is an established risk factor for poorer quality of life, and sleep, and symptoms of depression and anxiety [6]. Unfortunately, it is also one of only three independent risk factors for mortality in patients with type 2 diabetes mellitus [7].

There is a significant burden not only financially on health care but also for individuals in terms of the impact on their lifestyles and quality of life as well as their mood [8]. It is of paramount importance that we address the needs of this population of patients with pain symptoms given that pain is often perceived as a mere peripheral symptom to a broader disease process. However, the burden on both the individual and society is vast and requires significant attention.

The Walton Centre Pain Management Programme (PMP) service has been in existence for over 30 years and currently holds a registry of patient data to track baseline physical function and psychological distress as well as efficacy of treatments. Since 2014 the PMP service has seen approximately 4500 patients through multidisciplinary assessment clinics and approximately 5% of these patients have a diagnosis of diabetic neuropathy.

METHODS

This is a narrative review for the most part based on a lecture provided at the 4th British Symposium on Diabetic Neuropathy (November 2019 held at the University of Liverpool, UK) delivered by Dr. Hannah Twiddy (Research Lead Clinical Psychologist for the Pain Management Programme, The Walton Centre), specifically pertaining to the psychological services provided for patients under the care of The Walton Centre NHS Foundation Trust (Liverpool, UK) PMP. We also undertook a brief literature review on painful diabetic neuropathy (pDN) and psychological interventions/pain management programmes

using key search terms. A number of publications were retrieved, covering the spectrum from cross-sectional studies, cohort studies, randomised controlled trials (RCT), systematic, and thematic reviews. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

RESULTS

Current Management of pDN

pDN is a debilitating feature of diabetic neuropathy which results in poor quality of life, functional impairment and morbidity [9]. Current international guidelines advocate the use of pharmacotherapy targeting the pathomechanisms of pain generation in pDN. Moderate improvements in pain are considered to be approximately 30–50% pain relief, whereas a good outcome is considered greater than 50% pain relief [10]. Patients should be routinely counselled about the effectiveness of neuropathic pain agents in that only about one in three people will achieve ‘good outcomes’ [11]. As a result a significant proportion of individuals have significant inadequately control pain and as a result, poor functioning. There is very little focus in international guidelines on delivery of functional improvements through psychological interventions.

For a further review of diabetic neuropathy and treatment of pDN we recommend a review of Iqbal et al. [11] and Alam et al. [10].

Psychosocial Impact in Diabetic Neuropathy

There is a notable evidence base that discusses the interference on physical and psychological functioning of neuropathic pain in the context and out of the context of diabetes [12, 13]. Indeed, mental comorbidity and sleep disorders are factors associated with pDN and greater pain intensity, more diabetes complications and lower quality of life [14]. It is not uncommon to assess patients in a tertiary centre and discover

comorbid psychological distress. Previous studies have highlighted the magnitude of psychological burden in this population [12, 13]. Vileikyte et al. demonstrated that diabetic neuropathy ($n = 338$) is a risk factor for depression due to pDN with increased pain, unsteadiness and restrictions in activities of daily living significantly predicting poorer outcomes on the Hospital Anxiety and Depression subscale (HADS-D) over 18 months [15]. Both depression and anxiety are closely related to pain and pain intensity [16, 17]. Additionally, people with moderate-to-severe depressive symptoms are more likely to develop pain [18]. Indeed, Collins et al. suggested that anxiety disorders (32%) were more prevalent than depression (22%) in diabetes [19] which is replicated by other studies in pDN that found anxiety disorders to be as prevalent as depression [20]. The intensity of pain experienced in pDN directly impacts function and increasing intensity of pDN is associated with increased anxiety and depression. Clearly, there is a complex bidirectional relationship of anxiety/depression and pDN [20]. As clinical psychologists within the pain management service we conceptualise pain as a causative factor in many mood-related difficulties. Often these factors do not work in a linear fashion, and how we cope with pain can be affected by pre-existing psychological vulnerabilities which forms a part of the assessment process. Primary depressive or anxiety disorder should be treated in the first instance before embarking on psychological interventions for pain; we refer individuals on to the relevant mental health services once the primary issues have been managed.

The Walton Centre PMP Assessment in Clinic

The Walton Centre PMP meets the aims, method, delivery and outcomes as per the British Pain Society’s guidelines for pain management programmes for adults [21], the key points of which are:

1. To improve participation in daily activities of living, enhancing quality of life in people with chronic pain

2. A variety of methods being utilised by the PMP for directly/indirectly producing behaviour modification, including cognitive and behavioural therapy
3. The standard practice of outcome evaluation such that stakeholders can ascertain participant characteristics and the range of improvements as a result of the PMP, in both the short and longer term

The reduction or relief of pain is not a primary aim of treatment, although improvements in pain are often reported [22, 23]. The primary focus is to improve daily functioning even in the absence of pain improvement and to shift the behaviour of the participant from inadequate coping with pain and subsequently to focus behaviour on individualised targets which are more worthwhile [21].

Figure 1 and Table 1 highlight the key domains and areas for assessment in patients with persistent pain within the PMP service [24]. Attendance is required at the assessment clinic for 4 h and patients see four different clinicians: a pain consultant, clinical psychologist, a physiotherapist and an occupational therapist. The patient has about 45 min with each clinician and at the end of the assessment there is a multidisciplinary case conference discussion about clinical presentation from the



Fig. 1 Domains of impact and areas for assessment

different disciplinary perspectives. This includes evaluation of medical, physiotherapy, social mental health-related factors which may impact their presentation. In concluding the clinic, a personalised care package is discussed.

The impact of pain from the four areas highlighted in Table 1 (i.e. biomedical, physiotherapy, occupational therapy and psychology) is significant with varying degrees of input from each. It is important to collect information about day to day life, relationships, employment and social life as much as pain intensity and severity and to establish the significance of mood-related factors in relation to loss of confidence and self-esteem. A major concern of patients is the notion that others disbelieve the pain symptoms, symptoms are exaggerated or are indicative of health anxiety or psychosomatic complaints. It can be difficult to conceptualise the pain for patients. The use of metaphors and analogies can help individuals to understand; it is also key to move away from lists of symptoms such as burning, throbbing, tingling pulsating and focus on—‘ok you have those symptoms, tell me about how those symptoms impact across these domains...’.

Psychologists working in chronic pain gather information regarding an individual’s locus of control [25]; how much does the individual feel that they can be an agent in bringing about change in their circumstances? This is broadly more relevant to diabetes in terms of treatment adherence and the ability and capability to effectively manage physical wellbeing. In chronic pain, it relates to self-efficacy, a feeling of being effective in managing symptoms and pain intensity [26]. The feeling that patients have an internal locus of control can result in a positive outlook of ‘I can bring about change to my life’, as opposed to a negative outlook of ‘I am going to wait here until something external happens to help me to improve my life’. In patients with an external locus of control and low levels of pain-related self-efficacy, we may consider that a number of factors could thwart self-management approaches.

The PMP consists of both behavioural and cognitive techniques; in addition, physical exercise and education are also part of the processes of delivery. Previous studies have shown

Table 1 Key areas for biopsychosocial assessment [57]

Biomedical aspects	Physiotherapy aspects	Occupational therapy aspects	Psychology aspects
Nature of the pain condition	Level of physical deconditioning	Impact of pain across all occupational domains	Current psychological symptoms
Aetiology of pain	What is an appropriate level of physical activity?	Day to day routine and structure	Impact of pain on mood and activity
Physical prognosis	Is there evidence of overly restricted movement associated with fear avoidance?	Aids and adaptations	Pain beliefs and behaviours—including fear and avoidance
Need for further medical or surgical interventions and medication side effects	Are there outstanding issues requiring further medical review?	Goals and value-led activities	Prior psychiatric history
Is the pain medically proportionate and/or makes organic sense?		Pacing	Treatment adherence in other comorbidities
			Iatrogenic distress
			Motivation to change and locus of control

the effectiveness of PMP interventions. In a meta-analysis of 11 studies, treatment gains across pain perceptions were maintained at 12 months post-treatment and provided evidence for long-term efficacy of PMP interventions [27]. An early systematic review in 1999 [28], which was subsequently updated in 2012 as a Cochrane review [29], concluded that Cognitive Behavioral Therapy (CBT) (on which PMPs are based) is an effective intervention in the armoury of the management of chronic pain. Other studies have drawn similar conclusions in mixed pain groups [30, 31]. As with other studies the benefits are greatest in psychological functioning measures. The residential INPUT Pain Management Unit reported clinically significant improvement in pain and psychological measures by 19–55% at post-treatment and 17–44% at 9-month follow-up.

We detail psychological treatments and interventions in our PMP in more detail below.

Psychological Treatments

In the same manner that the assessment of neuropathic pain takes a biopsychosocial approach, the objective of psychologically led interventions is not only the reduction in pain but improvement in quality of life and mood-related measures [32]; some measures included are the Beck Depression Inventory (BDI-II), chronic pain acceptance questionnaire (CPAQ), pain-related self-efficacy questionnaire and the pain catastrophising questionnaire. Patients with both neuropathic and musculoskeletal conditions attend for psychological interventions at The Walton Centre PMP service. However, there are some factors, from a

psychological perspective, that are relevant when we consider the differences between the underlying pain types. Patients with neuropathic pain often describe allodynia, which makes their presentation different than musculoskeletal pain, as the pain is less predictable. Musculoskeletal disease pain can be readily amenable to physical exercise, whereas neuropathic pain conditions including pDN are less so, although some benefit may still occur with exercise [33]. Modifications to the introduction to the importance of physiotherapy, in terms of helping people to modulate movement in neuropathic pain conditions, can be vital [34].

Neuropathic pain needs to be considered in the context of other comorbidities, such as diabetes. Poor management of pain may itself impact treatment adherence and management of other physical conditions, whereas improving neuropathic pain may promote improvements in glycaemic control [35]. For instance, in a database analysis of approximately 4300 people with diabetes, patients who were adherent to pDN medications were more adherent to oral antidiabetic medications [36]. There is evidence to suggest that there is poorer glycaemic control in individuals with pDN [37]. Pai et al. [37] showed that increased postprandial glycaemic exposure, as assessed by high glycated haemoglobin (HbA1c) and near-normal fasting plasma glucose levels, is associated with an increased risk of pDN in type 2 diabetes. Unfortunately, complications of diabetes are also associated with psychological comorbidities. In a longitudinal cohort ($n = 4623$) of patients with type 2 diabetes followed up from 2000–2002 to 2005–2007, major depression was associated with significantly higher risks of adverse microvascular outcomes [hazard ratio 1.36 (95% CI 1.05–1.75)] and adverse macrovascular outcomes [1.24 (95% CI 1.0–1.54)] after adjustment for prior complications and clinical/demographic, and diabetes self-care variables [38]. Similar findings were also noted in the DIACET study conducted in an over 65 years population in Japan ($n = 4283$) where a higher Patient Health Questionnaire-9 (PHQ-9) was associated with increased odds ratios for retinopathy, symptoms related to peripheral neuropathy and autonomic

neuropathy, and end-stage renal disease requiring dialysis after adjustment for clinical and demographic factors and HbA1c [39]. A systematic review (22 studies) and meta-analysis (11 studies) of depression was associated with an increased risk of both incident macrovascular (hazard ratio 1.38; 95% CI 1.30–1.47) and microvascular disease (hazard ratio 1.33; 95% CI 1.25–1.41). Additionally, two studies ($n = 230,000$) examining baseline diabetes complications were suitable for meta-analysis and showed an increased risk of incident depressive disorder (hazard ratio 1.14; 95% CI 1.07–1.21).

There are two treatment modalities in PMP: individual and group based. The format of group-based PMPs follows the multidisciplinary guidelines set out in the British Pain Society guidelines. At The Walton Centre the two main groups are run over either 16 days or 5 days over 6-week periods [40].

Acceptance and commitment therapy (ACT) is a psychological modality that has been used with increasing interest in chronic pain. It is considered a third-wave of CBT and can be used alongside more traditional CBT [41–43]. Traditional CBT approaches are focused on identifying thoughts, feelings and behaviours that may drive and maintain presenting psychological difficulties. In the context of chronic pain the focus is often around pain beliefs, e.g. the origin of my pain is sinister or will harm me, and the associated behavioural response. At The Walton Centre, it is through supporting individuals to identify unhelpful patterns and responses that change to habituated patterns and subsequent mood disturbance can be addressed. ACT utilises acceptance and mindfulness strategies along with commitment to behaviour change to support individuals to develop psychological flexibility; an individual's ability to respond to changing demands and alterations in emotions. In the case of chronic pain, strategies are focused on learning to live effectively and alongside pain, an unpleasant experience, through identifying value-led behaviour change and mindful approaches. It can be provided on a one-to-one basis if deemed necessary. A recent study of 50 individuals with pDN based in Iran

showed improved pain acceptance following intervention after 3 months [41].

Considering the generalisability of psychological approaches to a primary care population, a Brief Cognitive Behavioural Therapy for Chronic Pain (Brief CBT-CP) delivered in a community setting in the USA showed improvements in pain intensity but importantly improvements in functional limitations and pain-related efficacy outcomes [44]. Adapted approaches such as the Brief CBT-CP are eminently feasible in a community setting; however, this will clearly require restructuring of services and community and/or ambulatory psychological input which are generally underdeveloped [45].

Outcomes

Monitoring outcomes is key to assessing the efficacy of self-management approaches in chronic pain. At The Walton Centre a range of psychometrics and physical function measures are collected across domains [32]. These are namely:

Beck's Depression Inventory 2nd Edition (BDI-II) consists of 21 items to assess the intensity of depression in both clinical and non-clinical populations [46]. The BDI-II was developed to correspond to *Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV)* criteria for diagnosing depressive disorders. Given the high prevalence of depression in individuals with chronic pain and the negative outcomes

Table 2 Clinically meaningful change after PMP (The Walton Centre internal audit—unpublished)

Measure of clinical outcome	Percentage achieving clinically meaningful change
Depression	60%
Pain acceptance	72%
Pain intensity	37%
Pain catastrophising	63%
Disability questionnaire	44%

associated with such comorbidity, the importance of assessing depressive symptoms is widely acknowledged by chronic pain specialists.

Pain Catastrophising Scale (PCS) is a 13-item self-report measure designed to assess catastrophic thoughts or feelings accompanying the experience of pain [47]. The questionnaire uses a 5-point scale ranging from 0 (not at all) to 4 (all the time). Pain catastrophising affects how individuals experience pain. People who catastrophise tend to do three things. They ruminate about their pain ('I can't stop thinking about how much this hurts'), they magnify their pain (e.g. 'I'm afraid that something serious might happen'), and they feel helpless to manage their pain ('there is nothing I can do to reduce the intensity of my pain').

Pain Self-Efficacy Questionnaire (PSEQ) is a 10-item questionnaire, developed to assess the confidence people with ongoing pain have in performing activities while in pain [48]. The PSEQ is applicable to all persisting pain presentations, covering a range of functions, including household chores, socialising, work, as well as coping with pain without medication.



Fig. 2 Key areas for consideration in clinical practice to enhance a biopsychosocial approach

Table 3 Highlights key areas with common “dos and don’ts”: practical tips for medical practitioners to identify psychosocial red flags

Practical tip	Dos	Don’ts
Develop rapport	Listen and validate physical symptoms Gently acknowledge the emotional impact of living with pain and the broader quality of life issues that could benefit equally from attention	Advise the patient that persistent pains can be caused by psychological problems or trauma
Signpost	Consider referring the patient on to clinical health psychology services or ask the GP to refer on to local service provisions	Try to manage the patient’s psychological issues independently if they need expert opinion e.g. “exercise for a better mood”, “think about all the positive things” Discharge them with no biopsychosocial plan or reference in your clinical correspondence to primary care that you have observed mood-related difficulties in the context of physical symptoms
Consider relevant systemic factors and build up a picture of holistic wellbeing	Enquire about treatment adherence in other comorbid health conditions Consider the age of the patient and the specific difficulties pain may have on life stage e.g. career/education/starting a family	
Observe and make note of any discrepancies between physical disability/pain and distress	Ask patients to rate on a visual analogue scale (0–10) the level of pain distress/intensity and disability they experience—make note if pain intensity is high but distress is low and consider onward referral to psychological services	
Communication style and language	Use accurate and clear language. Reduce the risk of misunderstandings by ensuring that the patient understands accurately what you have advised Ask the patient at the end if they need any aspects to be clarified or anything has caused undue concern	Avoid vivid and distressing analogies of structural problems Avoid unhelpful and potentially inaccurate predictions of physical prognosis

Self-efficacy beliefs in people with chronic pain have been assessed either by reference to confidence in ability to perform specific tasks or

confidence in performing more generalised constructs such as coping with pain.

Pain intensity is rated from 0 (no pain) to 10 (the most intense pain imaginable), taking into

account how you have felt over the last week. This commonly used method of rating pain intensity is reliable and valid, and no one scale consistently demonstrates greater responsiveness in detecting improvements associated with pain treatment [49].

In addition to the measures stated above, a number of tools have been utilised and validated to screen depression (PHQ-9 [50, 51], HADS [52, 53]) and anxiety (HADS [52], Generalised Anxiety Disorder 7-item scale (GAD-7) [54, 55]) in diabetes. However, there is a word of caution: these instruments are not diagnostic but should be used for screening purposes [56] as elevated scores can be as a result of diabetes symptomatology.

Table 2 highlights the average percentage of patients who achieve clinically significant change on PMPs (data based on more than 4500 patients from a clinical audit at The Walton Centre—unpublished).

Whilst it is the job of a registered psychologist to identify specific psychological needs and possible mental health diagnoses, there are some things that non-psychological practitioners can helpfully do to help mitigate problems, and also signpost on when necessary.

The take-home messages include validate pain, which means acknowledge it is real and is impacting on the individual's quality of life. Even though it might be peripheral to a broader diagnosis that requires management by you a non-pain specialist, it is key to validate the pain experience. Consider the treatments offered—are they all biomedical, do they need some psychological input? Evaluate if the patient has any psychosocial red flags (Fig. 2; Table 3). In addition:

1. Are the patient's expectations realistic?
2. Are there expectations of the complete relief of pain?
3. Do they hope for this/a magical treatment?
4. Could language used by health-care professional possibly be feeding into misperceptions?
5. Is a referral to mental health or multidisciplinary pain team appropriate?

CONCLUSION

It is important to consider the holistic presentation of patients reporting persistent pain in the context of pDN. Ongoing referrals may be necessary to optimise outcomes, particularly if psychosocial factors are at play. Pain reduction is not the primary objective of pain management approaches and patients should be encouraged to consider issues of quality of life and goals associated with such areas.

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Compliance with Ethics Guidelines. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

Data Availability. Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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