Illness beliefs regarding diabetic foot ulceration predict mortality

Kavita Vedhara, Karen Dawe, Jeremy N Miles, Mark A Wetherell, Nicky Cullum, Colin Dayan, Nicola Drake, Patricia Price, John Tarlton, John Weinman, Andrew Day, Rona Campbell, Jenna Reps, Daniele Soria

Citation: Vedhara K, Dawe K, Miles JN et al (2016) Illness beliefs on diabetic foot ulceration predict mortality. *Journal of Diabetes Nursing* **20**: 288–90

Patients' illness beliefs have been associated with glycaemic control in diabetes and survival in other conditions and understanding patient beliefs – how they make sense of their diabetes and how they manage the condition – helps healthcare professionals to provide the best care possible. In this article, the authors examine whether the illness beliefs of people with diabetes and foot ulceration independently predict mortality.

Article points

1. People form illness beliefs when faced with a threat to their health, and these beliefs play a central role in determining their emotional and behavioural responses to the illness.
2. People's beliefs regarding their ulcers have a significant independent effect on survival.
3. These findings suggest that illness beliefs could improve our understanding of mortality risk in this patient group and could also be the basis for future therapeutic interventions to improve survival.

Key words

- Diabetic foot ulceration
- Illness beliefs
- Mortality

Authors

Author details can be found at the end of the article.

According to the self-regulatory model of illness (Leventhal et al, 1984), people form illness beliefs when faced with a threat to their health, and these beliefs play a central role in determining their emotional and behavioural responses to the illness. These illness beliefs centre around eight core issues that are hypothesised to interact with each other to form the overall illness schema (*Table 1*). The relationship between beliefs and outcomes is influenced by the nature of the disease in question; and, as such, specific beliefs or belief schema, are not universally associated with positive or adverse outcomes and are experienced differently from person to person.

Evidence suggests that patients' illness beliefs may not only affect their emotional and behavioural responses to illness but may also influence clinical outcomes. For example, a recent review demonstrated that illness beliefs are associated with glycaemic control in diabetes (McSharry et al, 2011). Furthermore, a study comparing the effects of depression versus illness beliefs in predicting dietary, quality of life and glycaemic control outcomes in diabetes, showed that illness beliefs were more consistent and stronger determinants of these outcomes than depression (Hampson et al, 2000). Research has also shown that illness beliefs may predict mortality. Studies have shown that in groups of people with end-stage renal disease, death was more likely in people who believed their treatment was less effective (van Dijk et al, 2009; Chilcot et al, 2011).

The study

We sought to add to this literature by considering the role of illness beliefs in predicting mortality in people with type 1 or type 2 diabetes who have a diabetic foot ulcer. Furthermore, in view of the prominence of depression as a predictor of mortality in people with diabetic foot ulcers (Winkley et al, 2007; Winkley et al, 2012), we examined whether illness beliefs predicted mortality, after examining the role of potential demographic and clinical determinants and depression. For a full account of the study, see Vedhara et al (2016).

Patients were recruited into a longitudinal research programme examining psychological and behavioural aspects of diabetic foot ulceration and the study was approved by the North Somerset and South Bristol Research Ethics Committee. All

Table 1. Illness belief components (Leventhal et al, 1984).

Belief components	Description
Identity	Beliefs regarding the experience of symptoms associated with the illness
Consequences	Beliefs regarding the outcomes of the illness
Timeline	Beliefs regarding the likely duration of the illness
Personal control	Beliefs regarding one's ability to influence the course of the illness
Treatment control	Beliefs regarding the effectiveness of treatment to cure or control the illness
Coherence	Beliefs regarding one's understanding of the illness
Emotional representations	Beliefs regarding the emotional impact of the illness
Causal representations	Beliefs regarding the cause of the illness

Page points

1. A total of 169 people were recruited into a longitudinal research programme examining psychological and behavioural aspects of diabetic foot ulceration.
2. People with less ischaemia, those who had a poorer understanding of their condition and those who perceived they experienced more symptoms, but also those who had a greater belief in the effectiveness of treatment, were most at risk of death.

participating patients provided written informed consent.

A total of 169 people with type 1 or type 2 diabetes and a neuropathic or neuroischaemic foot ulcer were recruited from outpatient podiatry clinics between January 2002 and January 2007. All clinics subscribed to a standard regimen of foot care and, at study entry, the following data were collected on all participants: age, gender, HbA_{1c}, number of previous ulcers, presence or absence of infection in the ulcer, diabetes type, presence of neuropathy and ischaemia, and ulcer size. Participants also completed self-report measures of illness beliefs related to their ulcers (Broadbent et al, 2006) and of depression (Zigmond and Snaith, 1983).

In November 2011, survival data were requested from GPs. This included whether they were deceased or alive on 1 November 2011 and, if they were deceased, their date of death.

Results

Of the 160 patients for whom data on mortality were available, 104 people were alive on 1 November 2011, 32 were deceased with date of death known, and 24 were deceased with date of death unknown.

The survival outcome was the number of days survived from the date of recruitment to 1 November 2011 or death from any cause. The analysis examining the data and predictors of mortality involved two steps. First, we considered all potential clinical and demographic predictors, as well as depression, in univariate analyses to identify the significant predictors. The results revealed that diabetes type (type 1 or type 2) and ischaemia were significant predictors of time to death.

In the second step, the measures of illness beliefs were added to these significant covariates. The analysis demonstrated that ischaemia remained a significant predictor of time to death (hazard ratio [HR], 0.976; $P<0.0001$). Identity beliefs (HR, 1.245; $P=0.036$) and coherence beliefs (HR, 0.775; $P=0.036$) also emerged as significant predictors.

Overall, people with less ischaemia, those who had a poor understanding of their condition, those who perceived they experienced more symptoms and those who had a greater belief in the effectiveness of treatment were most at risk of death compared with their respective counterparts. This is shown in *Figure 1*, which illustrates the average number of days survived based on a median split of patients' identity beliefs. It demonstrates that, on average, people who believed they experienced a lot of symptoms survived 5.2 years, compared with 6.2 years for those who believed they experienced fewer symptoms.

Conclusion

We examined the role of illness beliefs in predicting time to death in people with diabetic foot ulcers. Our analysis showed that, even after controlling for other predictors, illness beliefs, ischaemia and coherence beliefs predicted time to death: people who believed they experienced a lot of symptoms were at increased risk of death. Death occurred

"Taking illness beliefs into account during consultations may not only improve our understanding of the risk factors associated with mortality, but could also improve survival for people with diabetic foot ulceration."

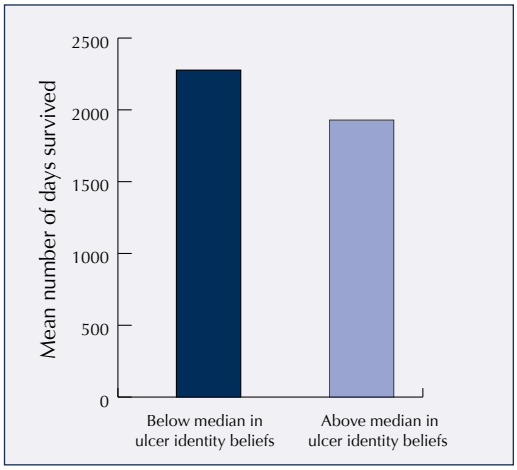

Figure 1. Average time in days survived from study recruitment for people with low and high in ulcer identity beliefs.

more quickly in individuals with less ischaemia, who perceived their ulcers were associated with greater symptoms and had a poorer understanding of their condition.

The findings from our study could simply reflect the fact that people with diabetic foot ulcers with greater symptoms are experiencing a greater severity of the condition, which results in a greater risk of mortality. This is not, however, consistent with what is known about neuropathic and neuroischaemic foot ulcers. Nerve damage is a defining feature of such ulcers. Consequently, the more severe the underlying pathology, the more likely the patient will experience fewer symptoms. Thus, if we were considering a pathophysiological explanation alone, then the experience of fewer symptoms (an indication of more severe disease-state) might be associated with a faster time to death, rather than the converse.

The relationship between illness beliefs and mortality may be made clearer by examining the whole belief schema of an individual (i.e. the relationship between all eight core issues shown in *Table 1*). Patients who believed their ulcers were associated with greater symptoms (high identity beliefs) also believed that their ulcers had more serious consequences for them, and were associated with greater emotional distress and less personal control. This constellation of beliefs may have led to unhelpful behavioural and/or emotional responses, such as poorer adherence to treatment, leading to the observed association with mortality.

Illness beliefs can be modified and, in doing so, can result in improvements in a range of outcomes, such as treatment adherence and mood across many different conditions, including diabetes (Broadbent et al, 2009a; 2009b; Petrie et al, 2012; Jones et al, 2015). Therefore, taking illness beliefs into account during consultations may not only improve our understanding of the risk factors associated with mortality, but could also improve survival for people with diabetic foot ulceration. ■

Authors

Kavita Vedhara is Professor of Health Psychology, Division of Primary Care, University of Nottingham; Karen Dawe is Research Fellow, School of Social and Community Medicine, University of Bristol; Jeremy N Miles is Behavioural Scientist, Rand Corporation, Santa Monica, CA, USA; Mark A Wetherell is Reader in Psychobiology & Health Psychology, Department of Psychology, University of Northumbria; Nicky Cullum is Professor of Nursing, School of Nursing, Midwifery & Social Work, University of Manchester; Colin Dayan is Director at the Institute of Molecular & Experimental Medicine, University of Cardiff; Nicola Drake is a Podiatrist, Department of Podiatry, Southmead Hospital, Bristol; Patricia Price is Dean and Head of the School of Healthcare Studies, Cardiff University; John Tarlton is Reader in Regenerative Medicine, Matrix Biology Research Group, University of Bristol; John Weinman is Professor of Psychology as applied to Medicine, Institute of Pharmaceutical Sciences, King's College London; Andrew Day is Consultant Medical Biochemist, Department of Clinical Biochemistry, University Hospitals Bristol; Rona Campbell is Professor of Public Health Research, School of Social and Community Medicine, University of Bristol; Jenna Reps is Senior Research Fellow, School of Computer Science & Advanced Data Analysis Centre, University of Nottingham; Daniele Soria is Assistant Professor in Computer Science, School of Computer Science & Advanced Data Analysis Centre, University of Nottingham.

Broadbent E, Petrie KJ, Main J, Weinman J (2006) The Brief Illness Perception Questionnaire. *J Psychosomat Res* **60**: 631–7

Broadbent E, Ellis CJ, Thomas J et al (2009a) Can an illness perception intervention reduce illness anxiety in spouses of myocardial infarction patients? A randomized controlled trial. *J Psychosomat Res* **67**: 11–5

Broadbent E, Ellis CJ, Thomas J et al (2009b) Further development of an illness perception intervention for myocardial infarction patients: A randomized controlled trial. *J Psychosomat Res* **67**: 17–23

Chilcot J, Wellsted D, Farrington K (2011) Illness perceptions predict survival in haemodialysis patients. *Am J Nephrol* **33**: 358–63

Jones CJ, Smith HE, Llewellyn CD (2015) A systematic review of the effectiveness of interventions using the Common Sense Self-Regulatory Model to improve adherence behaviours. *J Health Psychol* 8 May [Epub ahead of print]

Hampson SE, Glasgow RE, Strycker LA (2000) Beliefs versus feelings: A comparison of personal models and depression for predicting multiple outcomes in diabetes. *Br J Health Psychol* **5**: 27–40

Leventhal H, Nerenz DR, Steele DJ (1984) Illness representations and coping with health threats. In: Baum TS, Singer JE (eds). *Handbook of Psychology and Health Volume IV: Social Psychological Aspects of Health*. Erlbaum, Hillsdale, NJ, USA: 219–52

McSharry J, Moss-Morris R, Kendrick T (2011) Illness perceptions and glycaemic control in diabetes: a systematic review with meta-analysis. *Diabet Med* **28**: 1300–10

Petrie KJ, Perry K, Broadbent E, Weinman J (2012) A text message programme designed to modify patients' illness and treatment beliefs improves self-reported adherence to asthma preventer medication. *Br J Health Psychol* **17**: 74–84

van Dijk S, Scharloo M, Kaptein AA et al (2009) Patients' representations of their end-stage renal disease: relation with mortality. *Nephrol Dial Transplant* **24**: 3183–5

Vedhara K, Dawe K, Miles JNV et al (2016) Illness beliefs predict mortality in patients with diabetic foot ulcers. *PLOS One* **11**: e0153315

Winkley K, Stahl D, Chalder T et al (2007) Risk factors associated with adverse outcomes in a population-based prospective cohort study of people with their first diabetic foot ulcer. *J Diabetes Complications* **21**: 341–9

Winkley K, Sallis H, Kariyawasam D et al (2012) Five-year follow-up of a cohort of people with their first diabetic foot ulcer: the persistent effect of depression on mortality. *Diabetologia* **55**: 303–10

Zigmond AS, Snaith RP (1983) The hospital anxiety and depression scale. *Acta Psychiatr Scand* **67**: 361–70