Risk of diabetic foot ulceration: perception and behavioural change

Elizabeth Mudge and Patricia Price

Introduction

Patients with diabetes must have an accurate understanding of their perceived risk of diabetic foot complications, although this alone does not demonstrate that preventive measures are being taken to avoid this risk. Various theories of health behaviour have been suggested to explain why people fail to engage in positive health behaviour. An understanding of where a patient might be in the process of behavioural change may enable the practitioner to select the intervention that might prove most effective for that patient.

Foot ulceration is a widespread but potentially preventable complication of diabetes (Kumar et al, 1994; Coppini et al, 1997), representing the commonest reason for hospitalisation among patients with diabetes (Boulton, 1997). Approximately 45–70% of all non-traumatic lower-limb amputations are performed on patients with diabetes as a result of diabetic foot ulceration (Ferguson et al, 1996). However, only 29% of those patients with diabetic foot ulceration had previously considered that they were at risk of foot complications (Masson et al, 1989).

A greater understanding of the underlying aetiology and pathophysiology of diabetes has increased the complexity of recommendations given to patients with diabetes, and in turn increased the emphasis on patient self-management (Lewis and Bradley, 1994). Many health professionals assume that the public interprets risk information in a logical fashion and adopts behavioural changes to reduce this risk. However, overall knowledge and perception of risk rarely correspond with the adoption of health-protective behaviour (Cook and Bellis, 2001).

Although much has been achieved in the study of health behaviour, there is still a great deal more to understand before it is possible to predict the exact circumstances under which people will or will not engage in healthy behaviour. Behavioural change is a complex, dynamic issue, but an understanding of where a patient might be in the process of change may enable the practitioner to select the intervention that might prove most effective for that patient. In order to reduce the incidence of diabetic foot ulceration, the onus must therefore be on the practitioner, not only to provide knowledge to the patient, but also to assist the patient in the transition between acquiring knowledge and changing behaviour.

In order to help practitioners reflect on this important topic, this article covers several related areas, addressing key concepts that impact on the patient's ability to undertake behavioural change.

Perception of risk

Perception of risk has been identified as a central concept for understanding health and illness behaviour. An ability to sense and avoid harmful environmental conditions and to register and learn from past experience forms an essential part of survival (Fischhoff, 1995). This depends on several factors, which include early experiences, education, controllability, consequence and the type of person who makes the judgment (Osei et al, 1997). However, our ability to change or modify our environment can have both a positive or negative effect on risks (Slovic, 1987).

It has been observed that a person with strong initial beliefs on a subject will react favourably to new information if it is consistent with that person's original view,

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2 Patients with diabetes should have an accurate understanding of their perceived risk of foot ulceration.

3 Perception of risk is a complicated issue, which does not definitively lead to better healthcare behaviour.

4 Various theories of health behaviour have been suggested to explain why people fail to engage in positive health behaviour.

5 The health belief model may be a valuable tool to provide the framework for educational diagnosis, enabling the practitioner to focus upon relevant attitudes and beliefs, so that information may be best received.

KEY WORDS

- **Diabetic foot ulceration**
- **Self-management**
- **Perception of risk**
- **Behavioural change**

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1 People will generally accept much higher risks from voluntary activities than from involuntary hazards. Perhaps this is because voluntary actions are generally seen as controllable.

2 In general, a situation with a high probability of a mild consequence is usually taken more seriously than a situation with a small probability of a severe consequence.

3 Although it is important that patients with diabetes have an accurate understanding of their perceived risk of foot ulceration, this alone does not demonstrate that preventive measures are being taken to avoid that risk.

4 Various theories of health behaviour have been suggested to explain why people fail to engage in positive behaviour that will promote their health and wellbeing.

but will react adversely if the information is contrary to his or her belief (Slovic, 1987). This concept of social perception or attribution may also influence what information is ignored and what information is acted upon (Janis and Mann, 1979). Such action can result in an unconscious distortion and oversimplification of risk events. Thus, it would seem that beliefs and values are often strongly correlated and psychologically independent (Sjoberg, 2000). Presenting the same information about risk in different ways can therefore affect and alter an individual's perspective of that risk (Slovic, 1987).

Starr (1969) developed a method for weighing technological risks against benefits, and observed that people are willing to tolerate higher risks from activities that are seen as highly beneficial. For example, people will generally accept much higher risks from voluntary activities (such as skiing) than from involuntary hazards (such as food preservatives). Perhaps this is because voluntary actions are generally seen as controllable. Thus, the importance of conscious decision about risk perception must be weighed against the magnitude of consequences in risk acceptance.

Rogers (1997) examined the relationship between perceived risk and experience by addressing the processes by which people learn about risk and make choices about risks and benefits within their lives. This study compared public perception of the impact of acute risk events with chronic risk events using a pre–post-quasi-experimental design. It demonstrated that potential risk had a greater impact on perceived risk than acute risk, which would contradict the effective use of trial-and-error risk management.

There are many theories that may explain why some risk events lead to public concern, controversy and resolution, while others fail to trigger comparable public interest. Rogers (1997) suggests that events that become part of an ongoing pattern are more likely to lead to enhanced public concern. It could also be argued that a single event does not necessarily increase risk perception. If that were so, one would need to address how many events and at what severity would result in a regulatory transformation. In general, however, a situation with a high probability of a mild consequence is usually taken more seriously than a situation with a small probability of a severe consequence (Osei et al, 1997).

Lessons in risk perception can be learnt from work conducted in breast cancer research (Hopwood, 2000), where it has been found that women's perceptions of breast cancer risk were largely inaccurate and often associated with high levels of anxiety about cancer. Risk counselling that relied only on measuring probability, although necessary, was deemed an insufficient basis for dealing with personal risk. A tendency to overestimate risk of death from breast cancer did not correlate with more accurate estimates about comparative risk.

Hopwood (2000) noted that women with strong family histories of breast cancer tended to be influenced by a particular experience. The emotional impact of a family member's cancer and the woman's sense of vulnerability played a major role in perception of risk. How this information may be transferred to diabetic foot ulceration has not been shown, but it raises an awareness of issues such as anxiety and vulnerability upon perception of risk.

Rothemund et al (2001) also investigated perception of risk, anxiety, psychological distress and early detection behaviour in breast cancer. This research noted that knowledge and screening did not affect risk perception, which raises the question of how the concept of probability could be made more clear to the population in order to make understanding more accurate.

Although it is evidently important that patients with diabetes have an accurate understanding of their perceived risk of foot ulceration, this alone does not demonstrate that preventive measures are being taken to avoid that risk. It is apparent from these research papers that investigation into effective methods to reduce persisting biases is the way forward.

Health belief model

Various theories of health behaviour have been suggested to explain why people fail

to engage in positive behaviour that will promote their health and wellbeing.

Rosenstock first proposed the health belief model in 1966, and Becker et al further developed it in 1977 to explain and predict behaviour in health contexts. The health belief model suggests that an individual's motivation to take preventive action is dependent on his or her health beliefs, as opposed to particular personality traits. It is reliant on the patient's perceived level of susceptibility, perceived severity of the illness, perceived benefits and perceived barriers to carrying out the health behaviour. The model also proposes that a stimulus or cue is required to trigger awareness of a potential health risk.

Bloom Cerkoney and Hart (1980) used the health belief model to study compliance with diabetes regimens, and highlighted that the highest levels of compliance occurred with cues to action. A similar study (Harris and Lynn, 1985) suggested that it was a belief in the severity of the disease that had the greatest effect, indicating that improving attitude would influence better disease control. Brownlee-Duffeck and Peterson (1987) found that better compliance in adolescents was related to perceived severity and susceptibility, whereas adults complied better when they could see the perceived benefits.

These studies demonstrate the lack of a definitive result when trying to evaluate and compare the reactions of various groups. There is no certainty on how an individual patient will respond and react to healthcare information, which reinforces the theory that a person's own beliefs, experiences and life skills play an important role in his or her prognosis.

In diabetes, compliance does not necessarily result in cure; similarly, preventive measures cannot guarantee that the patient will not develop future problems. These observations have an obvious effect on patients' adherence to their treatment regimen, so it is understandable if patients adopt an attitude of 'what is the point?' as their perception of the benefits may be too low. The health belief model may therefore be a valuable tool to provide the framework for educational diagnosis, enabling the practitioner to focus upon relevant, identified attitudes and beliefs, so that information may be best received. It does not, however, presuppose or imply any particular strategy for change.

Health locus of control

Rotter (1966) described the 'health locus of control'. He suggested that behaviour was a function of the individual's belief, and that healthcare behaviour could be explained by either an external or internal locus of control.

An external locus of control exists when patients believe that their health outcomes are dependent upon fate or powerful others (Wallston et al, 1978), rather than being under their personal control. Such patients are generally thought to be the least compliant as they are less likely to engage in behaviour that could have a positive effect on their life. Alternatively, this view in itself may render the patient more amenable to prescriptions, recommendations, suggestions or assistance by healthcare professionals, which may in turn improve their compliance outcomes (Schlenk and Hart, 1984).

An internal locus of control is a belief that health outcomes are directly related to the individual's volitional behaviour. Patients with this philosophy are much more likely to do things for themselves, as they believe that they have a significant say in how their life is run. They are likely to be more aware of all aspects of their environment and would consequently be more aware of useful information for future behaviour, and hence take steps to improve their outcome (Rotter, 1966). However, they are equally likely to place greater value on skill or achievements and be concerned with ability, especially failure, which may render them resistive to subtle attempts of influence.

This scenario could have dire consequences with respect to a condition such as diabetic foot ulceration, which can develop even when patients are controlling their diabetes well, and could thus make patients view their positive efforts as failure.

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2 Optimistic biases in personal risk perceptions could seriously hinder efforts to promote risk-reducing behaviour.

3 Self-efficacy has been proposed as a central concept underlying behaviour. It refers to personal beliefs on how to deal with a situation, which is related to the level of control that people have in their own lives, and how they compare themselves with others.

4 Patients with higher levels of self-efficacy have been shown to be more able to manage their diabetes, and therefore the concept of self-efficacy could serve as a basis for identifying strategies to enhance diabetes self-care in the long term.

expectations after failure and are less likely to raise expectations for the future.

A study on patients' perceived control of their diabetes (Bradley et al, 1984) showed that the benefits of treatment were perceived to substantially outweigh the barriers. Although most of the patients in this study tended to attribute positive outcomes to medical treatment, they did not hold medical staff responsible when diabetes control was poor. This demonstrates that patients could have an external control perspective to treatment recommendations, and yet an internal locus of control to failure.

Unrealistic optimism

Unrealistic optimism occurs when the person perceives his or her own personal outcome as being more positive than others in similar circumstances.

Clarke et al (2000) tested the extent to which unrealistic optimism occurred in relation to each of the elements of the health belief model, and concluded that unrealistic optimism is broader than perceived risk, and was evident for all the elements of the health belief model. The participants generally saw their own outcomes as more positive than those of the average person of the same age and sex, yet all overestimated their own risk.

Weinstein (1987) also demonstrated that when people extrapolate from their past experience to estimate their future vulnerability, they do so with an optimistic bias. The hazards most likely to elicit unrealistic optimism were shown to be those associated with a belief that if the problem has not yet appeared, it is unlikely to occur in the future. This study showed that optimistic bias increases with the person's perceived element of preventing the hazard, and conversely decreases with perceived frequency and personal experience. The study was not, however, able to show the role of experience and perceived frequency, as these two variables were too highly correlated; thus Weinstein was unable to demonstrate ways to minimise this bias.

Optimistic biases in personal risk perceptions could seriously hinder efforts to promote risk-reducing behaviour. If people believe they are personally at less risk of developing diabetic-related foot problems than the general population or others in similar circumstances, it may be more difficult to encourage them to adopt prudent precautions. However, a general tendency to being optimistic may have positive effects on physical health, and in turn encourage the patient to try harder in the long term.

Self-efficacy

Self-efficacy has been proposed as a central concept underlying behaviour. It refers to personal beliefs on how to deal with a situation, which is related to the level of control that people have in their own lives, and how they compare themselves with others (Hurley and Shea, 1992). Individuals' confidence in their own ability to perform a task determines which behaviour they will engage in and how much time and effort they will put into achieving their goals (Bandura, 1977), which is an essential part of diabetes self-management.

If people have serious doubts about whether they can perform the necessary activities to produce certain outcomes, relevant information will not necessarily influence their behaviour. Thus, the strength of people's conviction of their own effectiveness is likely to affect whether they will even attempt to cope with a situation. This does not mean that expectation is the sole determinant of behaviour, but without appropriate skills and adequate incentives, efficacy expectations will dictate the amount of effort and time that a person will give to sustain his or her health behaviour.

Bandura (1977) observed that individual expectations are not solely reliant upon experienced self-mastery, but many are derived from vicarious experience. Seeing the achievements of others can thus be a positive factor in increasing self-efficacy.

Conversely, verbal persuasion has not been shown to influence behaviour. Simply informing patients that they will or will not benefit from a treatment regimen has not been shown to influence their beliefs, especially when the information contradicts their personal experience. However, verbal persuasion that

reinforces a person's ability to master a situation, together with accompanying aid, has been shown to improve self-efficacy (Bandura, 1977).

Patients with higher levels of self-efficacy have been shown to be more able to manage their diabetes (Hurley and Shea, 1992), and therefore the concept of self-efficacy could serve as a basis for identifying strategies to enhance diabetes self-care in the long term.

Bandura (1977) noted that performance attainment is another important source of efficacy information. Successes are more likely to enhance self-efficacy if they are perceived as resulting from personal skill as opposed to luck or external aids. Conversely, failures that are attributed to ability are more likely to reduce self-efficacy. It is important that a patient understands the nature of the behaviour that is required and the circumstances in which it needs to be performed.

Information gained from cognitive psychology (Bandura, 1977) has shown that underestimation of a situation will result in more positive discrepancies between self-efficacy and performance attainments, whereas overestimation will have a negative discrepancy.

Locus of control is often considered analogous to self-efficacy; however, convictions that outcomes are determined by a person's own actions can have a number of effects on self-efficacy end-behaviour (Bandura, 1977); those patients who lack the requisite skills may experience low self-efficacy. Therefore, it would seem that in order to change self-efficacy it would be necessary to develop a person's competency of personal effectiveness.

Patient knowledge and lifestyle

Patients' knowledge about the consequences of their conduct is important in making decisions and choices about their health. However, an increase in knowledge alone does not improve health behaviour in the long term (Stuart and Wiles, 1997), as a person's knowledge is frequently incompatible with his or her behaviour (Litchfield and Ramkissoon, 1996).

The effectiveness of a learning contract on levels of diabetic foot care knowledge demonstrated that despite improved levels of knowledge at the end of the programme, patients still did not perceive themselves as being vulnerable to future foot problems as a consequence of their diabetes (Stuart and Wiles, 1993). A similar conclusion was observed by Barker et al (1992), who found that almost half of patients who were aware of diabetic foot complications did not take any precautions.

These studies emphasise that patients do not necessarily see the relevance of what they are told, particularly if they are free from symptoms at the time. Patients suffering from peripheral neuropathy might consider the lack of pain in their feet as beneficial, and hence not perceive any urgency in seeking medical attention.

A study by Williams et al (1967) observed that patients with a history of poor diabetic control were actually those with the best overall knowledge of diabetes. This finding suggests that patients with poor control have experienced more associated problems and hence received more medical intervention and advice, but that knowledge alone is not necessarily an influencing factor in health behaviour. There is also the negative possibility that fear or shock of witnessing severe foot complications could lead to an attitude of denial among some patients, and hence deter preventive behaviour completely.

Most risk messages are obtained through the mass media, and also more increasingly through the worldwide web. It is apparent that the mass media covers risks selectively, so as to provide better 'story value'. In doing so, rare or dramatic risk situations provide a disproportionate amount of media coverage. This situation may explain social amplification of certain risks and social complacency regarding other risks.

Lifestyles have also been found to carry little or no explanatory power for risk perception (Sjoberg, 2000), even though lifestyle is a popular theme for marketing and commercial contexts. None of cultural therapy (Dake, 1991), values in general or the psychometric model (Fischhoff et al, 1997) explain much about risk perception; however, a more crucial factor that may

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3 Many of the complications of diabetic foot disease can be prevented, and the prognosis for early diagnosis is good.

4 It is therefore essential that the patient is offered the best chance of avoiding this extremely disabling condition.

explain risk perception is a person's attitude to the risk (Dunn and Beeney, 1990; Anderson and Fitzgerald, 1993). If this were so, risk communication would require a different approach from those applied by the above models, and would suggest that behavioural strategies are evidently more efficacious than purely educational programmes.

Jessor (1991) observed from epidemiological research that much of the burden of illness could be linked to patterns of human behaviour and lifestyle, which clearly compromise health and safety.

Motivational interviewing

Doherty and Roberts (2002) described the internal conflict that a person experiences around lifestyle change as being the result of mixed feelings or ambivalence. This can be frustrating for the practitioner, because the patient understands the benefits of change but may also have powerful reasons for resistance. Motivational interviewing works on the philosophy that the patient and the practitioner must work together to explore the difficulties of lifestyle change in a non-judgmental environment. This is achieved by the use of open questions, reflection and summary, with clear goals and specific strategies to highlight ambivalence and develop a commitment to change (Doherty and Roberts, 2002).

In a study on smokers, Prochaska and DiClemente (1983) observed how people progress through a series of stages when changing behaviour. These stages of change integrate the processes and principles of a number of models and theoretical frameworks, and are subsequently known as the transtheoretical model of change (Prochaska and Velicer, 1997).

The transtheoretical model construes change as a process involving the progression through a series of six stages:

- Precontemplation
- Contemplation
- Determination/preparation
- Action
- Maintenance
- Relapse.

It is necessary for the practitioner to identify at what stage in this process the patient is in, and match this to his or her strategy of treatment (Prochaska et al, 1992). It also emphasises which approach is necessary from the practitioner in order to increase impact and effectiveness.

The psychological models discussed earlier may all be used to explore where the patient may be experiencing difficulty with change. An understanding of the health belief model may be helpful to improve outcome, or the principles of self-efficacy may explain a person's confidence in his or her ability to perform specific actions (Plotnikoff et al, 2000), or to move that person from one stage into the next.

Conclusion

Perception of risk is clearly a complicated issue, which does not definitively lead to better healthcare behaviour. There is little doubt that how we lead our lives and how we perceive ourselves both directly and indirectly affects our health. There are no easily definable patient types, and health beliefs can be both inhibitors and facilitators of adherence to medical regimens.

It would appear that behavioural strategies are evidently more efficacious than purely educational programmes, and an understanding of patients' social, psychological and cultural facets are as important as the physiological symptoms of patients' problems. Additionally, most patients will recycle several times through the stages of change before achieving long-term maintenance (Prochaska et al, 1992), so this is a life-long process.

Many of the complications of diabetic foot disease can be prevented, and the prognosis for early diagnosis is good (Barth et al, 1991). It is therefore essential that the patient is offered the best chance of avoiding this extremely disabling condition. ■

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