

Adherence to treatment in patients with type 2 diabetes

Marie Clark

ARTICLE POINTS

1 Adherence to treatment is a complex health behaviour. Asking non-responders about their adherence will detect more than 50% of those with low adherence.

2 Research demonstrates that many people with diabetes do not actually take their prescribed medication.

3 Failure to take medication as instructed may be the result of rational but mistaken beliefs about the medication.

4 The simplest and single most important action that healthcare providers can take to improve adherence is to select medications that permit the lowest daily dose frequency possible.

KEY WORDS

- Adherence to treatment
- Non-adherence behaviours
- Health psychology models
- Strategies to improve adherence
- Intervention studies

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Introduction

Non-adherence to medication is potentially one of the most serious problems facing diabetes care delivery, particularly in type 2 diabetes. This article, the first of three, looks at the many psychosocial factors that affect how people with diabetes manage their condition, and possible reasons for low adherence, such as rational but mistaken beliefs about the medication. Health psychology models and possible strategies to improve adherence are discussed in relation to diabetes. The need for more research into behavioural aspects of diabetes management in order to tackle adherence is also acknowledged.

Adherence has been defined as the extent to which individuals follow the instructions they are given for prescribed treatments (Haynes et al, 2002). Thus, if a person is prescribed an antibiotic to be taken as one tablet four times a day for a week for an infection, but takes only two tablets a day for five days, their adherence would be $(10/28=)$ 36%. The term adherence is intended to be non-judgmental – a statement of fact rather than of blame of the individual, the prescriber, or the treatment. Compliance and concordance are synonyms for adherence. Adherence to treatment is a complex health behaviour. Problems identified include the individual's failing to initiate therapy, underusing or overusing a treatment, stopping a treatment too soon, and mis-timing or skipping doses (e.g. Ley and Llewelyn, 1995).

Non-adherence to treatment is a formidable problem, leading as it often does to a reduction in or lack of treatment benefits, extra visits to the doctor, unnecessary hospitalisation, decreased satisfaction with medical care and sometimes further medication prescription. This can be extremely costly, not only to the individual involved, but also to the healthcare system as a whole. Non-adherence persists regardless of the medical condition being treated and exists across socioeconomic and geographic boundaries (Myers and Midence, 1998).

Measurement

Since there is no gold-standard method of measuring adherence, one of the main difficulties in managing low adherence is a lack of accurate and affordable measures. Clinicians must frequently rely on their own judgement, but unfortunately demonstrate no better than chance accuracy in predicting the adherence of their patients (Stephenson et al, 1993), even among those for whom they feel confident about their predictions (Gilbert et al, 1980). Based on a systematic review of studies of adherence measures (Stephenson et al, 1993), asking non-responders about their adherence will detect more than 50% of those with low adherence, with a specificity of 87% (Haynes et al, 2002). Even when people indicate that they have not taken all their medications as prescribed, their estimates usually substantially overestimate their actual adherence. The key validated question is 'Have you missed any pills in the past week?' and any indication of having missed one or more pills signals a problem with low adherence.

Overestimation of adherence by patients is difficult to study and is presently poorly documented. Reasons for overestimation could include difficulty recalling the details of medication taking, attempting to please practitioners, to avoid confrontation, or a combination of these factors.

Other practical measures to assess

adherence include watching for those who do not respond to increments in treatment intensity and people who fail to attend appointments. More objective measures of adherence can also be of use when available, for example drug levels in the body (blood and urine), but these measures are often subject to wide individual variations in drug absorption, distribution and metabolism. Moreover, this method is intrusive and not necessarily acceptable to everyone, which might distort the sample of people available for assessment. It is also expensive, and not available for all drugs used.

Finally, medication monitors, which are electronic measurement devices used to record for example the opening of a bottle to remove medication, can provide both frequency and patterns of use but these are expensive and cumbersome for routine practice.

Various measures of adherence are listed in *Table 1*.

Adherence in diabetes

The issue of non-adherence to treatment is particularly pertinent in diabetes care since increasing numbers of large randomised controlled trials (for example the UK Prospective Diabetes Study, 1998) have provided unequivocal evidence of the benefit of glycaemic control through the use of oral hypoglycaemic agents (OHAs) to prevent progression of microvascular complications, and lowering of blood pressure and lipids with further medication to reduce macrovascular disease in people

with type 2 diabetes.

Accordingly, considerable effort is now being devoted to ensuring that those with diabetes are prescribed appropriate medication. The National Service Framework for diabetes in England and Wales (Department of Health, 2001) for example, sets as its standard that all individuals with diabetes should have an assessment of glycaemic control, blood pressure and cardiac risk and receive the appropriate medication to reduce them. The consequence of such a policy is that most patients with type 2 diabetes will end up being prescribed at least five, and often more, different types of medication. Indeed, many who also have active ischaemic heart disease are already prescribed over nine different tablets, the rationale being that the cumulative effect of this drug cocktail will be equivalent to the sum of the benefits demonstrated in separate trials.

However, recent research, which demonstrates that many people with diabetes do not actually take their prescribed medication, challenges this assumption. Donnan et al (2002) used the DARTS/MEMO database to calculate adherence among 2920 people with type 2 diabetes taking a single type of oral medication. Their finding that adequate adherence was only observed in around a third of those taking either metformin or a sulphonylurea raises considerable doubt that the degree of benefit found in formal trials will be observed in clinical practice. This level of non-adherence, if the prescription was appropriate in the first place, represents not only a lost opportunity for health gain but considerable wastage of health resources. While non-adherence to dietary recommendations has been well described (Levy et al, 1998), non-adherence to medication is potentially one of the most serious problems facing diabetes care delivery, particularly in type 2 diabetes.

The work of Donnan et al (2002) highlights the limitations of many clinical trials, which while providing guidance to the best therapies, may overestimate the benefit that may accrue when treatment is applied in a clinical situation. Furthermore,

PAGE POINTS

1 Most patients with type 2 diabetes will be prescribed five or more types of medication.

2 Trial results showed that only about a third of those taking metformin or sulphonylurea had adequate adherence.

3 Non-adherence to medication is one of the most serious problems facing diabetes care delivery.

Table 1. Measures of adherence

- Self-report
- Using the healthcare professionals judgement
- Objective measures, e.g. pill counts
- Checking prescriptions
- Electronic measurement devices, e.g. Prescript TimeCap
- Outcome measures, e.g. HbA_{1c}
- Direct methods, e.g. blood and urine analysis
- Direct observation

PAGE POINTS

1 Research shows those with diabetes find it more difficult to focus on the long-term benefits of therapeutic targets.

2 A study by Donnan et al suggests complex 'best therapy' is unlikely to be effective if strategies to improve adherence are not devised.

3 In general, 30–40% of medication is not taken as prescribed.

4 Non-adherence behaviours broadly fall into two categories: unintentional (e.g. forgetting medication), or intentional (i.e. a rational decision not to take medication).

5 Adherence rates often vary between treatments and over time within the same individuals.

6 The Health Belief Model and Theory of Planned Behaviour have demonstrated a relationship between adherence to perceived barriers.

research indicates that individuals with diabetes find it much more difficult to focus on the long-term benefits of such therapeutic targets and focus instead on the short-term demands of adopting the necessary intensive strategy (Mulhauser and Berger, 2000).

What steps need to be taken then to address the limitations in treatment that recent research highlights so clearly? The current approach to the management of type 2 diabetes suggests that multiple treatments are often essential to reduce the risks of microvascular and macrovascular disease (UKPDS 33; 34; 1998) but the Donnan et al (2002) study suggests that complex 'best therapy' is unlikely to be effective if strategies to improve adherence are not devised. However, before effective adherence intervention studies can be mounted the reasons for low adherence need to be explored.

Non-adherence behaviours

Although variations in the conceptualisation and measurement of adherence behaviours hamper generalisation, it is suggested that between 30–40% of medication in general is not taken as prescribed (Meichenbaum and Turk, 1987).

Non-adherence behaviours broadly fall into two categories. Unintentional non-adherence occurs when the person's intentions to take the medication are thwarted by barriers such as forgetting, or inability to follow treatment instructions because of poor understanding or physical problems such as poor eyesight or impaired manual dexterity. Deliberate or intentional non-adherence arises when the person decides not to take the treatment as instructed. The latter has been called 'intelligent non-compliance' in recognition of the fact that viewed from the person's perspective, non-adherence may be the result of a rational decision (Weintraub, 1990; 1981).

Early research into medication adherence attempted to identify the features of a disease or treatment that act as barriers to adherence, and searched for demographic factors and personality traits that distinguished the 'non-compliant' person.

The limitations of this research are highlighted by findings that adherence rates often vary between treatments and over time within the same individuals (Cleary et al, 1995; Hilbrands et al, 1995). Most people are non-adherent some of the time.

Further research which focused on the identification and removal of barriers to adherence suggests that improving communication with clear, easily remembered instructions and tailoring the regimen to fit in with the person's lifestyle enhances adherence in some situations (Cleary et al, 1995; Ley et al, 1995). An interesting aspect of this work was the inclusion of people's satisfaction with practitioner-patient interactions as a possible determinant of medication adherence (Ley 1982; Gibbs and George, 1990). This acknowledges the role of motivation and emphasises that non-adherence may not just be the unintentional consequence of incompetence or lack of knowledge on the part of the patient.

Health psychology models

This recognition that what a person thinks influences what they do stimulated more psychologically-based research into medication adherence, prompting the question 'Why do some patients go to the trouble of visiting their doctor and then decide not to take the treatment?'. Theoretical developments in health psychology have provided a number of models that attempt to explain patients' health-related decisions in terms of perceived values, expectancies and response selections based on these. Research applying these models to medication adherence provides some evidence that people's initial decisions are influenced by their beliefs about the need for treatment and perceptions of the associated benefits and risks (Hampson et al, 1996, 1995; Ried et al, 1988; Harris et al, 1985; Kelly et al, 1987).

The two models which have been most frequently applied to the issue of medication adherence are the Health Belief Model (Rosenstock, 1974) and the Theory of Planned Behaviour (Ajzen, 1985). Studies have demonstrated a relationship between adherence and perceived

barriers, such as patients' beliefs about the degree to which the medication regimen will disrupt their normal routine (Becker et al, 1978) and between general attitudes to medication, i.e. harmful versus helpful (Ried and Christensen, 1988). Furthermore, people's perceptions of the views of significant others, such as doctors or relatives, have been shown to be strong predictors of adherence (e.g. Miller et al, 1992). However, some of these approaches have been criticised for conceptualising adherence as the result of a 'one-off' rational decision. In contrast, the Self-Regulatory Model of Illness Behaviour (Leventhal et al, 1980; 1992) conceptualises adherence as a dynamic interaction between the person's beliefs about the identity (including symptom experience), cause, consequences, timeline and potential for control or cure of their illness. It also incorporates their subjective evaluation of the effects of medication upon their illness, with particular emphasis on symptom experience.

More recent research has focused on people's beliefs about medication (Britten, 1994; Donovan and Blake, 1992; Horne, 1997). This research suggests that people form coherent beliefs about specific aspects of their treatment, which seem to influence adherence. Findings suggest that, for a significant number of people with common chronic illnesses such as diabetes, failure to take medication as instructed may be the result of rational but mistaken beliefs about the medication.

Strategies to improve adherence

For long-term self-administered medications, as in the case of diabetes, the methods of helping people adhere to regimens that have been tested and found to be successful have typically been complex and labour-intensive. These methods have modest effects at best on adherence and inconsistent effects on clinical outcomes.

Morris (2004) states: 'Probably the simplest and single most important action that healthcare providers can take to improve adherence is to select medications that permit the lowest daily dose frequency

possible'. Negotiating priorities with people with diabetes, providing clear instructions and assessing their knowledge and understanding, reminding them about appointments, monitoring adherence with treatments and appointments, calling them if they miss appointments for required follow-up care, and reinforcing the importance of high adherence at each visit will provide practical and effective help to enable many to follow their regimens. Furthermore, if needed, and with the person's permission, the help of family members and significant others can be sought.

Intervention studies

A systematic review of the literature on interventions for helping people to follow prescriptions for medications conducted by Haynes et al (2002) concluded that current methods of improving adherence are mostly complex and not very effective. To date, few intervention studies have been conducted to evaluate whether changing beliefs that are associated with non-adherence, can enhance adherence. However, before effective interventions can be developed in diabetes care, the reasons for non-adherence need to be explored by more direct research with patients, in which the behavioural aspects of the management of medication regimens could be explored in a non-judgmental way.

We are currently conducting a study, in collaboration with Lorraine Avery and colleagues at the Chichester Diabetes Centre, to explore the reasons for non-adherence to prescribed regimens in people with type 2 diabetes, using both quantitative and qualitative methodologies. Current methods of improving medication adherence for chronic health problems such as diabetes are mostly complex, labour-intensive, and not predictably effective (Haynes et al, 2002). As such, results from this study may inform the development of innovative approaches to helping people adhere to their prescribed treatments. Furthermore, this design has advantages over previous studies enabling both the assessment of people's cognitive representations of their medication and

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1 The Self Regulatory Model of Illness Behaviour conceptualises adherence as an interaction between the patient's beliefs and potential for control or cure of their illness.

2 Patients form beliefs about specific aspects of their treatment, which seem to influence adherence, therefore non-adherence may be the result of rational but mistaken beliefs about the medication.

3 Morris (2004) states: 'Probably the simplest and single most important action that healthcare providers can take to improve adherence is to select medications that permit the lowest daily dose frequency'.

4 Reasons for non-adherence need to be explored by more direct research with patients into behavioural aspects of medication regimen management.

5 A study currently being undertaken uses both quantitative and qualitative methodologies into adherence in diabetes.

PAGE POINTS

1 A patient-centred approach to diabetes management may affect adherence as it addresses patient beliefs about illness and treatment.

2 It is possible secondary failure of OHAs with subsequent insulin requirement is due to poor treatment adherence rather than beta-cell exhaustion.

3 Poor adherence is a significant obstacle to the benefit of complex drug regimens in type 2 diabetes.

4 Once major factors relating to non-adherence are identified, intervention studies to improve adherence can be developed.

illness, as well as providing insight into the complex lay beliefs about medication that people hold. This may elucidate the patterns and predictors of non-adherence in people with type 2 diabetes.

Conclusion

Over the past two decades, research has shown adherence to be a multi-factorial phenomenon. Non-adherence may be the intentional result of a rational decision based on personal beliefs about the illness and treatment as well as the unintentional consequences of lack of ability to manage the medication regimen. Recent calls for a more patient-centred approach to the management of diabetes (for example, the NSF) are timely in relation to the issue of adherence to medication in diabetes. Patient-centred approaches should focus on the person's own ideas about the illness and treatment, and the degree of concordance between their perceptions and that of the healthcare professional (Clark and Hampson, 2002).

Research also suggests that adherence to medication in type 2 diabetes is poor. Indeed, as has been suggested by Donnan et al (2002), it is possible that secondary failure of OHAs with subsequent requirement for insulin may, in fact, be due to poor adherence rather than to beta-cell exhaustion, as is frequently assumed. Poor adherence is a significant obstacle to the benefit of complex drug regimens in the treatment of type 2 diabetes. Once the major factors relating to non-adherence are identified, intervention studies to improve adherence can be developed. These might include:

- improved patient-centred education emphasising self-management and empowerment for those with diabetes
- health professional education
- the development of an adherence 'tool' for use in routine consultations
- greater carer involvement in medication management.

Low adherence to treatments has been associated with poor outcomes, even when the treatment was a placebo (Haynes and Dantes, 1987). Effective ways to help people with diabetes to follow medical treatments could, importantly, have far

greater effects on health than any treatment itself, largely because the results could be applied so broadly. ■

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