Supporting people with diabetes to engage with insulin therapy

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Article points

1. Concordance of people with diabetes to insulin therapy is currently suboptimal, with many people omitting or reducing doses.
2. Improved engagement and concordance with insulin therapy is necessary in order to improve glycaemic control and outcomes.
3. Poor concordance may be due to numerous reasons including fear of hypoglycaemia, weight gain and inflexibility of dosing regimens.
4. Engagement with therapy may be improved through greater communication and involvement of people with diabetes in their own care.

Key words

- Concordance
- Diabetes mellitus
- Engagement
- Hypoglycaemia
- Insulin

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People with type 1 diabetes require exogenous insulin from diagnosis, ideally in the form of multiple-dose regimens. Due to the progressive nature of type 2 diabetes, the majority of people with this condition will ultimately require insulin therapy to maintain good glycaemic control. In terms of managing hyperglycaemia, insulin is currently the most efficacious treatment for diabetes. Although it has demonstrated efficacy in people with type 2 diabetes, there is reluctance both on the part of people with diabetes and of healthcare professionals to initiate and intensify insulin therapy. There are also significant barriers to full concordance with insulin therapy in people with type 1 diabetes. This article will discuss and consider the literary evidence around the views of people with diabetes and healthcare professionals and their attitudes towards insulin therapy, its impact on lives and lifestyles, and issues surrounding acceptance of and engagement with insulin therapy.

Despite strong evidence that good glycaemic control reduces the risk of developing diabetic complications (Stratton et al, 2000; Holman et al, 2008), a large proportion of people with diabetes on insulin are not meeting the advised glycaemic targets (Dale et al, 2010). Non-concordance with insulin therapy is common (Donnelly et al, 2007; Peyrot et al, 2012), as is delayed initiation of insulin therapy in people with type 2 diabetes (Brown et al, 2004; Khunti et al, 2012). To improve outcomes for people with diabetes in the UK, it is necessary to address the concerns of people with diabetes and healthcare professionals (HCPs) regarding insulin therapy, and to provide practical methods for improving concordance.

Background

Early diabetes treatment, as described in the *Diabetic Manual for the Mutual Use of Doctor and Patient* by Elliott Joslin (Joslin, 1924), focused on collaboration between the individual with diabetes and physician to manage the symptoms of diabetes. By 1945, however, when the *The Cookery Book for Diabetics* was published (British Diabetic Association, 1945), people with diabetes had become much less involved in the treatment of their condition, with more emphasis placed on following a restrictive insulin regimen laid down by the physician.

Since the first discovery and purification of human insulin, improvements in insulin technology have led to the production of a range of rapid- and longer-acting insulins and insulin analogues, as well as fixed combinations of short- or longer-acting insulins. This, in turn, has allowed the introduction of basal–bolus multiple-injection insulin regimens that better mimic physiological insulin secretion. In people with type 1 diabetes who are solely dependent on exogenous insulin, multiple-injection therapy is the current standard of care (Inzucchi et al, 2012).

It is also a proven option in people with type 2 diabetes whose condition has progressed despite treatment with oral antidiabetic drugs (OADs; Nathan et al, 2009). Although effective, complex treatment regimens incorporating multiple injections place considerable demands on people with diabetes in terms of their knowledge, skills and ability to integrate treatment regimens into day-to-day lifestyles (Peyrot et al, 2012).

Barriers to insulin initiation

Insulin initiation in type 1 diabetes

Due to the nature of the condition and the requirement for exogenous insulin, the majority of people with type 1 diabetes will be transferred to a diabetologist and the diabetes team for insulin initiation. At diagnosis, these people are usually symptomatic, with a range of predominantly osmotic symptoms, and they will initially benefit from an increased sense of wellbeing and reduction in symptoms post-initiation of insulin therapy. Because of this, for the majority of people with type 1 diabetes, early experience of insulin initiation may be positive, providing relief from the negative symptoms of hyperglycaemia (Vijan et al, 2005; Polinski et al, 2013). For many, however, there may be significant challenges later on in terms of acceptance of diagnosis and the "burden" of living with a condition with a high risk of complications, significant lifestyle implications and a demanding treatment regimen.

Insulin initiation in type 2 diabetes

Unlike type 1 diabetes, the treatment of type 2 diabetes generally remains the remit of primary care, with diet, exercise and OAD interventions the initial focus (Nathan et al, 2009; Inzucchi et al, 2012). Basal or biphasic insulin therapy is usually commenced when oral hypoglycaemic agents or glucagon-like peptide-1 (GLP-1) receptor agonist therapy fails to provide adequate reductions in HbA_{1c} levels (Nathan et al, 2009). However, current guidelines from the American Diabetes Association and European Association for the Study of Diabetes recommend that in people with diabetes with a high baseline HbA_{1c} (≥75 mmol/mol [9%]) who are deemed unlikely to respond to initial OAD monotherapy, insulin may be considered as initial therapy and should be strongly considered from treatment outset in people with diabetes with HbA_{1c} ≥86 mmol/mol (10%; Inzucchi et al, 2012). While these guidelines demonstrate that earlier introduction of insulin therapy would be beneficial for a subset of people with type 2 diabetes (Inzucchi et al, 2012), it can take up to 5 years for physicians to initiate insulin therapy, even in the presence of sustained hyperglycaemia (Brown et al, 2004; Khunti et al, 2012).

Barriers to the initiation and intensification of insulin therapy exist in the minds of both people with diabetes and HCPs. Research demonstrates that up to a third of people with type 2 diabetes initially decline insulin or state that they would be unwilling to take insulin if prescribed (Polonsky et al, 2005), while physicians state concerns regarding patient acceptance of insulin therapy as a reason for delaying initiation (Brown et al, 2004; Peyrot et al, 2012).

Some common concerns, such as the risk of hypoglycaemia, are shared by people with diabetes and HCPs, while others are more specific to either people with diabetes or care-givers (Kunt and Snoek, 2009). If the barriers to insulin therapy are to be removed and concordance of people with diabetes with insulin regimens improved, the concerns of both groups must be addressed.

Patient barriers

Although there has not been a great deal of clinical research in this area, some effort has been made to examine psychological resistance to insulin therapy in people with type 2 diabetes (Polonsky et al, 2005; Kunt and Snoek, 2009). Negative beliefs about insulin therapy are common among insulin-naïve people with type 2 diabetes, particularly those who state that they would be unwilling to accept insulin if it was prescribed (Polonsky et al, 2005). Among the chief concerns for these people with diabetes are the risk of potential side effects, particularly hypoglycaemia, and how these may affect their ability to function in day-to-day life (Polonsky et al, 2005; Kunt and Snoek, 2009).

It is well established that hypoglycaemia can have a significant negative effect on quality of life and wellbeing, with fear of hypoglycaemic events, as well as the episodes themselves, negatively

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2. Barriers to the initiation and intensification of insulin therapy exist in the minds of both people with diabetes and HCPs. Research demonstrates that up to a third of people with type 2 diabetes initially decline insulin or state that they would be unwilling to take insulin if prescribed.
3. If the barriers to insulin therapy are to be removed and concordance of people with diabetes with insulin regimens improved, the concerns of both groups must be addressed.

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1. Concerns for people with diabetes include worries about the permanence of insulin therapy and the implications for how they have managed their condition; the complexity of treatment regimens; and their ability to manage their treatments and fit injections around their normal life.
2. Many people with diabetes may also view commencement of insulin as being synonymous with "worsening" diabetes or an indication that they have failed to manage their diabetes correctly.
3. Research has indicated that healthcare professionals may also have concerns about starting insulin therapy, despite sub-optimal glycaemic control.

affecting people with diabetes (Pramming et al, 1991; Williams et al, 2011). Although more focus is placed on preventing severe hypoglycaemic events (where third-party assistance is required), there is increasing evidence that non-severe episodes also place a significant burden on people with diabetes (Brod et al, 2011). One study has shown that nocturnal non-severe hypoglycaemic episodes have a significant effect on people with diabetes, causing them to change their behaviour (Brod et al, 2012). Up to a quarter of the people with diabetes in this study (18.5–25.7%) reported decreasing their insulin dose following a nocturnal non-severe hypoglycaemic episode.

The consequences of hypoglycaemia on driving can be profound. If Group 1 drivers (holders of ordinary driving licence) have experienced more than one episode of severe hypoglycaemia within the previous 12 months they must inform the Driver and Vehicle Licensing Agency (DVLA). For Group 2 drivers (bus/lorry), one episode of severe hypoglycaemia must be reported immediately (see DVLA website for more details: http://bit.ly/1pHNgrh). This may make individuals reluctant to discuss hypoglycaemia episodes with their healthcare professional or to artificially elevate their blood glucose levels in order to reduce the risk of hypoglycaemia. For those whose livelihood or quality of life depends on their ability to drive, the risk of hypoglycaemia may be one they are unwilling to accept.

Other concerns for people with diabetes include worries about the permanence of insulin therapy and the implications for how they have managed their condition; the complexity of treatment regimens; and their ability to manage their treatments and fit injections around their normal life. Fear of needles and the discomfort associated with regular injections and blood glucose monitoring are also mentioned (Polonsky et al, 2005; Peyrot et al, 2012; *Box 1*).

Box 1. Common patient barriers to initiation of insulin therapy.

- Fear of hypoglycaemia.
- Fear of weight gain.
- Restrictiveness of regimen.
- Driving and lifestyle concerns.
- Fear of needles (trypanophobia).
- Confidence in ability to administer insulin.
- Perception of "failure".
- Permanence of insulin therapy.
- Not wanting to inject in public.

In addition to the perceived negative impact of insulin therapy on daily life, many people with diabetes also view commencement of insulin as being synonymous with "worsening" diabetes or an indication that they have failed to manage their diabetes correctly (Polonsky et al, 2005; Kunt and Snoek, 2009). Along with this is negative feeling toward the permanence of insulin therapy and the belief that once it has been initiated, the person with diabetes will remain on insulin for life (Polonsky et al, 2005; Kunt and Snoek, 2009).

Health-professional barriers

Several studies have shown that health professionals delay initiating insulin therapy, even when glycaemic targets are not being met. In a recent retrospective cohort study (Goodall et al, 2009), the authors found that not only were HbA_{1c} measurements poorly recorded for the majority of people with diabetes, but that even where data were available, at least 40% of individuals failed to achieve a modest HbA_{1c} target of 58 mmol/mol (7.5%). Despite this poor control, the average time spent on monotherapy was 3.8 years and, even after failing to achieve glycaemic control with two or more OADs, the median time before commencing insulin therapy was 7.7 years from initiation of the final OAD. Therefore, the average time to initiation of insulin was at least 11.5 years from the initial diagnosis of type 2 diabetes. It is clear that people with diabetes would not be maintaining generally accepted modest glycaemic control targets for a substantial proportion of this time (Goodall et al, 2009).

In a survey of the attitudes of HCPs and people with diabetes towards insulin therapy, investigators found that the measured factor most strongly associated with a decision to delay insulin was clinical efficacy (possibly due to the difficulty in balancing HbA_{1c} reductions with increased risks of hypoglycaemia and weight gain;

Peyrot et al, 2005). When this is combined with concerns regarding competence and the risks of hypoglycaemia (particularly in older people with diabetes) and weight gain (especially in those who are already overweight), it can lead to HCPs significantly delaying initiation (Brown et al, 2004; Kunt and Snoek, 2009).

Where insulin therapy is prescribed by GPs rather than diabetes specialists, there may be an additional factor influencing decisions to delay insulin. HCPs with little experience of insulin therapy may lack the confidence to initiate treatment or be particularly concerned about concordance with treatment and the risk of hypoglycaemia (Peyrot et al, 2005; Rubin and Peyrot, 2011).

Challenges post-initiation

Although it has been reported that people with diabetes with prior experience of insulin have fewer concerns related to insulin therapy (Polinski et al, 2013), there are still some issues, both with maintaining concordance with treatment and with progressing and intensifying insulin therapy in order to achieve and maintain good glycaemic control (Peyrot et al, 2012).

In a survey of the experiences of people with diabetes (type 1 and type 2) and physicians with insulin therapy, around a third (33.2%) of people with diabetes reported omitting insulin doses or not being fully concordant with treatment regimens, while around three-quarters (75.2%) of physicians reported that their typical patients did not take their insulin as prescribed (Peyrot et al, 2012). The main reasons given by people with diabetes for omitting or altering doses are shown in *Table 1*.

The burden of self-management and difficulty in fitting injections around day-to-day life is a common theme in discussions of concordance with insulin therapy (Peyrot et al, 2005; Vijan et al, 2005; Peyrot et al, 2012; Polinski et al, 2013). The rigidity of insulin dosing regimens and the requirement that basal injections be administered at the same time every day are major sources of insulin non-concordance (Peyrot et al, 2012).

Side effects of insulin therapy can have a negative effect on both the willingness of people with diabetes to follow their treatment regimen and that of HCPs to intensify treatment. Avoidance of weight gain has been stated as a reason for reducing or omitting insulin doses by people with diabetes (Peyrot et al, 2012), while GPs may be reluctant to increase insulin dose in people with diabetes who are already overweight (Kunt and Snoek, 2009). The risk of hypoglycaemia, meanwhile, remains a concern for both people with diabetes and health professionals post-initiation of insulin, particularly when considering treatment intensification (Peyrot et al, 2012). It has been reported that a majority of physicians (75.5%) would treat diabetes more aggressively if not for concerns about hypoglycaemia (Peyrot et al, 2012).

Table 1. Patient (*n*=530) reported reasons for insulin omission/non-adherence (adapted from Peyrot et al, 2012; reproduced with permission from John Wiley and Sons).

Reason	Patients (%)
Too busy	18.9
Travelling	16.2
Skipped meal	15.0
Stress or emotional problems	11.7
Embarrassing to inject in public	9.7
Challenging to take it at the same time every day	9.4
Forgot	7.4
Too many injections	6.0
Avoid weight gain	4.0
Regimen is too complicated	3.8
Injections are painful	2.6

Views and expectations of insulin therapy: people with diabetes versus health professionals

The issue of concordance is further complicated by the conflict between what a person with diabetes would view as an ideal treatment regimen and that preferred by health professionals. In the main, insulin-treated people with diabetes prefer to inject as few times per day as possible, allowing them the maximum flexibility to fit their

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1. The primary means of improving insulin acceptance and concordance by people with diabetes is good communication between them and HCPs regarding their insulin regimen and methods of administration.
2. Engagement with treatment may be improved by increasing involvement of people with diabetes in the choice of insulin regimen and insulin self-titration, allowing them to take greater control over their own treatment.
3. Hypoglycaemia and the fear of developing hypoglycaemia remain substantial barriers to the initiation and optimal use of insulin. It is imperative that the HCP should actively discuss hypoglycaemia concerns, including night-time hypoglycaemia fears.

injections around their daily life rather than vice versa. Health professionals, meanwhile, favour more frequent injections in order to more closely approximate physiological insulin and improve glycaemic control (Peyrot et al, 2012).

Physicians view the main issue with insulin therapy to be the inability of people with diabetes to understand and adjust their own insulin regimen as required. Only around a third of physicians questioned (29%) reported that their patients were successful with injecting basal insulin at the same time every day, while less that 10% stated that their patients were successful at adjusting their insulin doses (Peyrot et al, 2012). However, there is some evidence that patient-led rather than physician-led titration of basal insulin is effective at achieving glycaemic targets in people with type 2 diabetes (Davies et al, 2005; Blonde et al, 2009), suggesting that physicians should show more confidence in people's ability to titrate their insulin dose.

The impact of hypoglycaemia on the family

As well as having direct effects on the person with diabetes, diabetes and its treatment may also have a significant impact on the person's immediate family. In a study of the effects of hypoglycaemic events on the spouses of people with type 1 diabetes, investigators found that severe hypoglycaemic events had several negative effects on the psychosocial wellbeing of the spouse in areas of life related to diabetes and its management (Gonder-Frederick et al, 1997). The authors found that the spouses of people with type 1 diabetes feared hypoglycaemic events more so than did the people with diabetes themselves, and that episodes of hypoglycaemia led to greater marital conflict (Gonder-Frederick et al, 1997). Because of this, it is important to ensure that the partners or immediate family are well informed as to their relative's diabetes and treatment.

Helping people with diabetes overcome barriers to insulin treatment

The primary means of improving insulin acceptance and concordance by people with diabetes is good communication between them and HCPs regarding their insulin regimen and methods of administration (Meece, 2006). A realistic appraisal of the "pros and cons" of different regimens and their lifestyle impact, both positive and negative, should be carried out, along with open discussion in clinics around people's fears and concerns and the barriers imposed by their treatment. This may help dispel concerns, such as those regarding the efficacy of insulin, side effects, the pain of injection and the use of injection devices (Funnell, 2007; Barag, 2011). Engagement with treatment may be improved by increasing involvement of people with diabetes in the choice of insulin regimen and insulin self-titration (Khunti et al, 2013), allowing them to take greater control over their own treatment. Studies have shown that patient-led titration can produce better glycaemic control than HCP-led titration of basal insulin dose (Davies et al, 2005; Blonde et al, 2009).

Many people with diabetes may gain weight after initiating insulin therapy. This can be a particular problem for those people who use "defensive eating" in order to prevent the occurrence of hypoglycaemia during intensification of insulin therapy. The loss of glycosuria in insulin-treated people with diabetes may also exacerbate weight gain if no dietary changes are made to compensate for the retention of glucose previously lost in the urine (Laville and Andreelli, 2000). If weight gain is of particular concern, arranging a meeting with a dietitian before initiation of insulin may help to identify strategies to avoid this problem (Funnell, 2007).

Hypoglycaemia and the fear of developing hypoglycaemia remain substantial barriers to the initiation and optimal use of insulin. It is imperative that the HCP should actively discuss hypoglycaemia concerns, including night-time hypoglycaemia fears. Many people with diabetes fear hypoglycaemia as much as they do developing complications (Pramming et al, 1991), and hypoglycaemia may lead to increased depression, anxiety and reduced quality of life (Williams et al, 2011).

For many, tighter glycaemic control cannot be achieved without exploration of these fears and practical measures to overcome them. These fears also extend to the spouses of people with diabetes and the parents of younger people with diabetes in whom higher levels of anxiety and depression have been reported (Gonder-Frederick et al, 1997).

Supporting "buy-in" and engagement

- Ask the insulin user what they know about insulin. This is a helpful way of opening up a conversation about the ideas the media or family members may have instilled. You can then provide accurate advice and dispel any myths.
- Acknowledge that insulin therapy may result in a significant lifestyle change and remember that the individual may need time to digest the information and consider their decision.
- Encourage the insulin user to arrive at their own decisions to intensify insulin regimen rather than imposing a more complex regimen on them.
- Allow the person with diabetes to understand how their insulin regimen may help them – many on insulin have no real idea as to their insulin profiles and how basal or prandial components may help. Structured educational programmes, including group sessions, can be invaluable but not everyone wants to or can attend them.
- Wherever possible, teach self-adjustment skills almost straight away – don't take over and encourage dependence.
- "Ask" don't tell, "coach" don't instruct – in busy clinics, we can be too quick to give the "right" answer rather than allowing the individual to work it out for themselves but early coaching supports long-term independence.
- Externalising can help: the more complex the insulin regimen and the frequency of blood glucose monitoring, the more intimidated people with diabetes may feel – they "cannot see the wood for the trees." A simple method of externalising might be to ask your patient: "If these results were those of your best friend, what advice would you give?"
- Be realistic about goals and encourage the individual to set their own HbA_{1c} or blood glucose goals – they can often be more realistic than those of their HCP. Small steps in the desired direction can be a helpful first goal to enable quick success and instil confidence.
- Allow the individual to gather regular feedback. In carefully selected individuals, repeating HbA_{1c} even monthly initially can help the individual with poor self-efficacy to gain a sense of achievement in improved glycaemic control, allowing them to gain positive feedback on how they are doing with their diabetes management.
- Dietary review to allow for calories gained by loss of glycosuria to be offset by reduction in dietary calories.
- Use of metformin as an insulin sensitiser in those who are overweight, including, if tolerated, to a maximum of 1 g twice daily (Yki-Järvinen, 2001).
- Consideration in those with type 2 diabetes – where appropriate, licensed and not contraindicated – of concurrent use of basal insulin and GLP-1 receptor agonist therapy to further tighten glycaemic control and prevent weight gain or promote weight loss (Vora, 2013).

In contrast to the older, prescriptive model of healthcare, newer modes of treatment aim to engage the person with diabetes more fully in their own treatment. Patient empowerment recognises that people with diabetes should be in control of the day-to-day self-management of their diabetes (Funnell and Anderson, 2004). The aim is to provide individuals with sufficient information and education regarding their diabetes and the available treatments so that they are able to better manage their diabetes day to day (Funnell and Anderson, 2004).

Most importantly, HCPs and people with diabetes need to work together and communicate effectively in order to balance challenges regarding insulin therapy, its side effects and impact on day-to-day lifestyle with the need for good glycaemic control and the prevention of diabetic complications.

Conclusion

Engagement with insulin therapy for people with diabetes is vital to secure the best possible prognosis, but evidence suggests that concordance with therapy remains poor in practice. Significant barriers exist to the initiation and intensification of insulin therapy in people with type 2 diabetes, many of which are based on misconceptions or lack of confidence. In type 1 diabetes, concordance is chronically challenged by treatment complexity and the considerable effort required on the part of the person with diabetes to

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1. Engagement with insulin therapy can be improved by offering carefully selected individuals feedback on glycaemic control in order to give a sense of achievement.
2. Dietary review may help to prevent weight gain in the person with diabetes taking insulin.

"Concordance with therapy can also be facilitated by choosing regimens that are efficacious, well tolerated and as simple and flexible for the people with diabetes as possible."

successfully manage multiple-injection regimens.

There are, however, practical approaches based on better communication with people with diabetes that can be taken to improve engagement with therapy and so concordance with insulin regimens. Concordance with therapy can also be facilitated by choosing regimens that are efficacious, well tolerated and as simple and flexible for the people with diabetes as possible. ■

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