



Psychological insulin resistance: a critical review of the literature

A Gherman*, IA Veresiu, RA Sassu, JB Schnur, BL Scheckner, GH Montgomery

Introduction

Psychological insulin resistance (PIR) refers to psychological barriers to initiation and persistence with insulin therapy. Of the studies on this subject, most define PIR as reluctance to initiate insulin treatment; however, about a quarter of them also consider PIR to include insulin injections omission. Barriers are found in patients as well as in health care providers. This concept is defined in studies mostly as a diabetes management obstacle influenced by psychological factors (cognitive, emotional, relational, and cultural) and not as a psychological disorder.¹

By preventing patients from taking the insulin they need, PIR can cause patients' glycaemia levels to fall beyond recommended targets, and can put patients at risk for developing complications which can in turn reduce their quality of life and increase societal burden.² A cost-analysis of patients who started insulin therapy showed that health care costs initially increased by 10%, but that expenditures were reduced by 40% in the following nine months.³

Aims

The objectives of this paper were to answer the following questions: (1) How is PIR measured and studied? (2) What instruments are used to measure PIR? (3) What factors predict PIR in patients and in health care providers? and (4) What interventions have been proposed to reduce PIR?

ABSTRACT

Our objective was to conduct a critical review of the factors that account for psychological insulin resistance (PIR) and of the available strategies to reduce it.

Medline, PubMed, Cochrane reviews, PsycInfo, ProQuest, Science Direct, and EBSCO databases were searched and 60 studies were included in the final review. Topics reviewed included: research methods, instruments to assess PIR, PIR in patients and in the medical care team, and proposed strategies for overcoming it.

The results showed that a large number of factors account for PIR in patients. The main categories are emotional, cognitive, social/cultural, and interaction with health providers. Physicians mainly delay insulin because they lack knowledge on guidelines or pancreas physiology, they fear inducing hypoglycaemia in elderly or impaired patients, and/or they lack time or personnel resources to teach initiation. Strategies proposed to reduce PIR are educational and psychological (exposure, desensitisation, relaxation and counselling).

We concluded that there is a great need of evidence-based interventions that help remove psychological barriers about insulin use in patients, as well as in health care providers. Copyright © 2011 John Wiley & Sons.

Practical Diabetes Int 2011; 28(3): 125–128

KEY WORDS

psychological insulin resistance; review

Methods

The search methodology was performed according to PRISMA guidelines. All relevant databases in clinical psychology and medicine (Medline, PubMed, Cochrane reviews, PsycInfo, ProQuest, Science Direct, and EBSCO) were searched using the key words 'psychological insulin resistance', 'insulin refusal', 'treatment refusal (MeSH term) and diabetes', and 'adherence and insulin'. The search was performed from database inception until August 2010. We took into consideration all of the studies that investigated reluctance to use insulin in relation to any psychological factor, and we included qualitative papers, editorials, reviews, perspectives in practice, prospective studies, and cross-sectional studies.

Results

The search retrieved 252 abstracts. After duplicates were removed, 93 abstracts were screened; 22 abstracts were further excluded as they did not investigate psychological insulin resistance. The remaining 71 were assessed full-text for eligibility. Another 11 full-text articles were then excluded as they did not relate psychological factors to barriers in insulin use. The final number of studies was 60. (See Figure 1, and Appendix 1 which is available online at www.practicaldiabetesinternational.com). These studies were summarised according to the following criteria: the research methods used, the instruments used to measure the concept, the main factors that predict psychological insulin resistance in patients, the main factors that predict psychological insulin

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Received: 17 November 2010

Accepted: 1 February 2011



resistance in the medical care team, and the proposed strategies for overcoming psychological insulin resistance.

Types of literature articles

The manuscripts which report on PIR are editorials, reviews, perspectives in practice, cross-sectional studies, studies of construction and validation of instruments to measure PIR, and qualitative studies (see Appendix 1). There are no longitudinal studies that prospectively investigate PIR predictors before patients need insulin and then test their association with patients' decisions when insulin is actually recommended. There are also no randomised clinical trials testing the efficacy of any intervention to reduce PIR.

Instruments

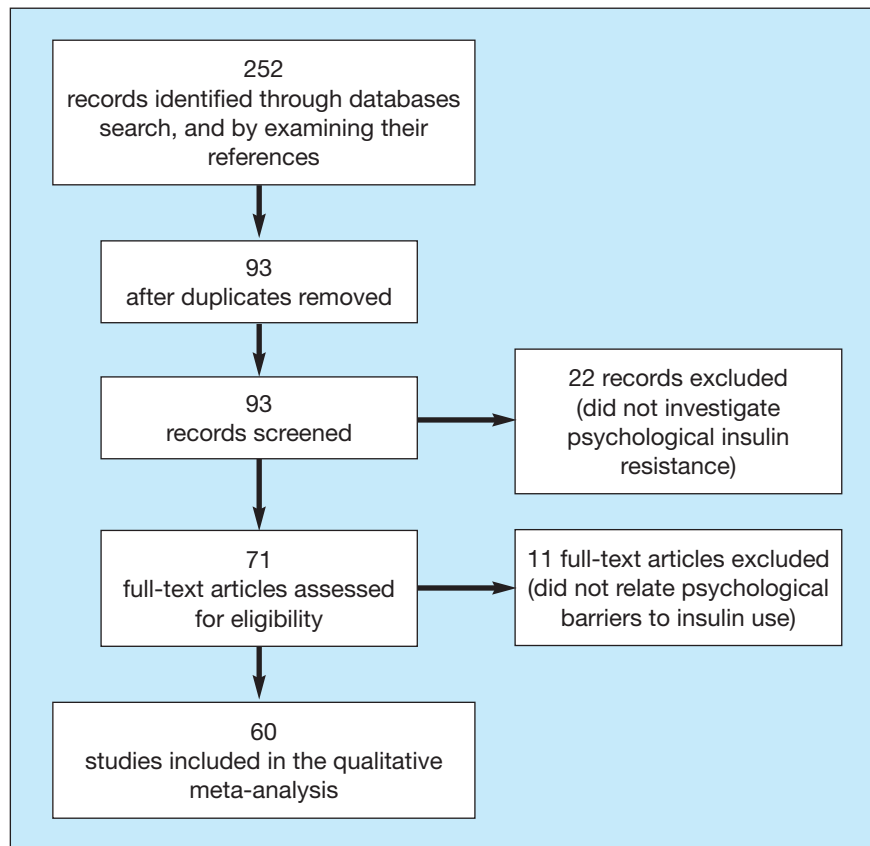
Several researchers have developed questionnaires to measure various aspects of PIR. The Barriers to Insulin Treatment Questionnaire⁴ measures fear of injections and self-testing, expectations regarding positive insulin-related outcomes, expected hardship from insulin therapy, stigmatisation from insulin injections, and fear of hypoglycaemia. The Insulin Treatment Appraisal Scale⁵ assesses negative and positive evaluations of insulin treatment. The Survey for People who do not take Insulin (SPI)⁶ is a questionnaire designed to identify reasons why people are reluctant to start insulin, including risk of side effects or complications and changes in lifestyle. The Diabetes Fear of Injecting and Self-Testing Questionnaire⁷ measures fear of self-injecting and fear of self-testing.

Overall, six measures investigate emotional distress related to insulin or its side effects, positive and negative expectations about it, and satisfaction or dissatisfaction with consequences on daily activities.

Patients' psychological insulin resistance

PIR in insulin naïve patients. The prevalence of PIR in insulin naïve patients has been investigated in several studies and their findings have been quite consistent across both clinical trials and community-based research. A large clinical trial in

Figure 1. Flow diagram of included studies



which patients with type 2 diabetes were randomised to insulin therapy found that 27% of patients initially refused treatment.⁸ In a survey of 708 community patients with type 2 diabetes not taking insulin, 28.2% reported that they would not take insulin even if it were prescribed by their physician.^{9,10} Thus, the percentage of insulin refusal in a research setting is similar to the percentage of the reluctance to potentially start insulin therapy in community samples, suggesting that nearly one-third of patients with diabetes could be at a greater risk for living with out-of-target glycaemia levels.

A synthesis of the studies revealed several themes and motives as to why patients refuse or avoid insulin or have low intentions to take insulin if recommended.

A salient category of factors that influence PIR refers to emotional states such as anxiety related to insulin side effects or depression symptoms, including: fear of needles or injection pain (more than 50% of insulin naïve patients with type 2 diabetes are unwilling to start insulin

therapy because of these fears);^{11,12} fear of hypoglycaemia (even mild episodes can disturb normal functioning and severe hypoglycaemias are accompanied by a variety of profound cognitive, emotional and behavioural effects);¹³ fear of weight gain (patients taking insulin gained 4kg more than those treated with diet therapy);¹² fear of dependence (39% of patients not receiving insulin indicated that fear of addiction to insulin was a barrier);¹² and depression (patients with type 2 diabetes who reported increased levels of depressive symptoms had significantly more negative beliefs about insulin).¹⁴

Other types of predictors are cognitive in nature: lack of knowledge (patients do not know what is involved in insulin administration);¹³ perceived interference with daily activities (about 50% of patients believe that insulin would restrict their lives);¹³ the belief that taking insulin is a sign that their diabetes had become worse or more dangerous (e.g. that if their diabetes was 'better' they could have stayed on diet or oral medications alone);¹⁵ perception of personal



failure (about half of patients not taking insulin believed that starting this treatment would mean that they had not followed treatment recommendations correctly);¹³ belief that insulin causes complications;^{15,16} not regarding diabetes as serious enough (about 47% of patients not receiving insulin argue that their illness is not so serious and, thus, they do not need to begin insulin treatment);¹⁷ and low self-efficacy (some of the patients do not feel confident that they could handle the day-to-day demands of insulin therapy).¹⁸ Other reasons cited include: beliefs that insulin will not be effective (less than one-quarter of insulin naïve patients believe that insulin would help them manage their disease better);¹⁸ and beliefs that good glycaemic levels can be achieved otherwise (25% of patients refused insulin because of beliefs that keeping a more strict diet, exercising, taking medication will control their diabetes¹³).

Lastly, the following have been found to be associated with PIR: social stigma (needles are usually identified with either intravenous drug addicts or severe illness; patient beliefs that they have to hide their injections to avoid disturbing others, or that taking insulin will result in family members and friends treating them differently);¹⁹ and cultural barriers (e.g. Hispanics seem to have a higher reluctance).²⁰

PIR in patients who already have experience with insulin. An analysis of the literature showed that PIR may be present even in patients who have agreed to take insulin and have experience with it. In such cases, PIR leads to omission of insulin injections for several reasons, including: skipping insulin intentionally to try to lose weight (omission of injection was found in approximately 30% of women with type 1 diabetes, with approximately half of the respondents reporting omitting insulin for weight-management purposes, sometimes related to eating disorders);²¹ skipping insulin to reduce interference with daily activities (over half of respondents reported intentionally skipping insulin injections because injections had a negative effect on one or more activities of daily living);²² pain/bruising (20% of patients on

insulin reported injection-related anxiety or scarring, 27% reported injection-related sensitivity, 37% reported injection-related pain, and almost half reported injection-related bruising);²³ social stigma (fear of social stigma when injecting in public, which results in either injecting too early or, in some cases, the omission of an injection);²⁴ and depression (higher levels of depression were associated with insulin omission and diabetes medication non-adherence).¹⁵

Relationship with health care providers

The majority of studies on PIR investigated more extensively the factors that influence patients than those that influence health providers. However, physicians are considered to have a crucial role in how patients get to regard insulin treatment. As such, the following deals with factors that impact on patients from the perspective of the medical team. Thus, being previously threatened by a physician to initiate insulin as a punishment for low adherence, perceiving the physician as inexperienced, and believing that insulin is an incorrect medical decision for them, usually increases resistance when insulin is actually necessary.¹⁶ Another study showed that being advised by a doctor not to use insulin was the second most frequent reason given for discontinuation.²³ Further, several factors explaining PIR in health care providers have been highlighted. These include: lack of knowledge of diabetes and current treatment guidelines (the DAWN study found that only about 50% of the providers believed that insulin could have a positive impact on care, physicians do not always have correct information about diabetes physiology);²⁵ fear of hypoglycaemia in elderly patients with type 2 diabetes who have serious comorbidities and reduced life expectancy;¹⁵ and lack of time and/or personnel to teach insulin initiation.²⁶

PIR as an on-going process

Regarding the continuous process of diabetes self-care, a couple of articles investigated the problem of how negative attitudes about insulin change after treatment initiation. In general,

most patients were satisfied and continued treatment,²⁷ decreased their negative attitudes and would even recommend insulin to other patients.²⁸ Furthermore, one study investigated this problem longitudinally:¹¹ of the patients prescribed insulin, 42.5% refused it initially, and half of these started treatment within six months. Unfortunately, the other half still refused insulin treatment after repeated counselling. Thus, insulin refusal may be very persistent, and more longitudinal studies may be necessary to see how the psychological barriers deepen or change in order to prevent people from accepting this treatment.

A summary of strategies for decreasing PIR

Several studies (e.g. Jenkins *et al.*²⁹ and Joy³⁰) offer guidelines for overcoming PIR. However, it should be noted again that none of these suggestions has been empirically tested. The first type of technique is educational and includes: teaching patients (and physicians) about diabetes; introducing the concept of insulin treatment from the onset; educating patients about diabetes progression before they actually need insulin; distinguishing between the natural progression of diabetes and complications because of high glycaemic levels; not threatening patients with insulin as a punishment; explaining insulin action times to prevent hypoglycaemias; teaching strategies to minimise weight gain (e.g. decreased caloric intake and increased exercise); and explaining the action of newer, more flexible types of insulin that allow more flexibility for the daily schedule.

Psychological techniques were also suggested for decreasing PIR, including: exposing patients to an insulin injection under medical supervision; encouraging patients to try insulin for a short period of time while monitoring the factors that one is afraid of and giving the possibility to 'opt-out' after a trial period; motivational interviewing; negotiating an insulin therapy schema adapted to patients' schedules; systematic desensitisation; relaxation; and sharing success stories of other patients' experiences.



Key points

- This review identified a major gap in the literature between theoretical knowledge and empirical validation of possible strategies: no empirical studies have been conducted on interventions to reduce psychological insulin resistance (PIR)
- Therefore, it is impossible for clinicians to choose an empirically validated treatment for this serious problem
- It is our recommendation that future research use experimental designs to test the efficacy and effectiveness of the proposed psychological interventions so that clinicians are aware of the most effective treatments for PIR

Discussion

PIR refers to psychological barriers to insulin use on several levels: emotional (e.g. anxiety about the expected impact on daily life, depression or guilt associated with needing insulin); cognitive (e.g. distorted beliefs about insulin treatment); behavioural (e.g. unpleasant negative consequences such as pain, bruising, hypoglycaemias, weight gain); social (e.g. feeling stigmatised); and relational (influencing factors from the medical health team).

On the whole, this is an area of research that used investigation methods such as qualitative, editorial, reviews, perspectives in practice, and cross-sectional. The literature has gathered several useful instruments to measure most of these aspects. However, instruments specifically devised for health professionals are lacking and perhaps one of the areas for future investigations is this one.

Future studies should also use a longitudinal approach in order to capture the most salient predictors of PIR and to investigate the most critical times when they influence insulin acceptance. At the same time, there is a great need of randomised controlled interventions to show which techniques or combination of techniques bring the fastest and less resource-consuming decrease in these psychological barriers. One type of intervention should focus on patients who are at the onset of diabetes and start an early process of education/counselling as a preparation for later initiation of insulin therapy; another type should focus on how to help patients accept insulin as soon as possible; and another on how to help patients adhere to their prescribed insulin plan and decrease their omission of

insulin injections. Furthermore, interventions should also focus on health care providers and train them in these techniques in order to reach a greater number of patients.³¹

In conclusion, there is a small but growing literature on PIR. The pioneers in this area have provided a strong foundation for understanding this phenomenon. However, much work remains to be done.

Acknowledgements

The authors wish to thank Dr Daniel David for his guidance and coordination in preparing the manuscript.

Declaration of interest

There are no conflicts of interest.

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 12. Larkin ME, *et al.* Measuring psychological insulin resistance: barriers to insulin use. *Diabetes Educ* 2008;34(3):511–7.
 13. Karter AJ, *et al.* Barriers to insulin initiation: the translating research into action for diabetes insulin starts project. *Diabetes Care* 2010;33(4):733–5.
 14. Sharma SK, *et al.* Lessons in initiating insulin in clinical practice. *Diabetes Res Clin Pract* 2008;81(Suppl 1):S16–22.
 15. Makine C, *et al.* Symptoms of depression and diabetes-specific emotional distress are associated with a negative appraisal of insulin therapy in insulin-naïve patients with Type 2 diabetes mellitus. A study from the European Depression in Diabetes [EDID] Research Consortium. *Diabet Med* 2009;26(1):28–33.
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 17. Nakar S, *et al.* Transition to insulin in type 2 diabetes: family physicians' misconception of patients' fears contributes to existing barriers. *J Diabetes Complicat* 2007;21(4):220–6.
 18. Blonde L. Easing the transition to insulin therapy in people with type 2 diabetes. *Diabetes Educ* 2007;33(Suppl 7):232S–240S.
 19. Funnell MM. Quality of Life and Insulin Therapy in Type 2 Diabetes Mellitus. *Insulin* 2008;3(1):31–6.
 20. Campos C. Addressing cultural barriers to the successful use of insulin in Hispanics with type 2 diabetes. *South Med J* 2007;100(8):812–20.
 21. Olmsted MP, *et al.* Prediction of the onset of disturbed eating behavior in adolescent girls with type 1 diabetes. *Diabetes Care* 2008;31(10):1978–82.
 22. Peyrot M, *et al.* Correlates of insulin injection omission. *Diabetes Care* 2010;33(2):240–5.
 23. Oliveria SA, *et al.* Barriers to the initiation of, and persistence with, insulin therapy. *Curr Med Res Opin* 2007;23(12):3105–12.
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 28. Ahmed US, *et al.* Barriers in initiating insulin therapy in a South Asian Muslim community. *Diabet Med* 2010;27(2):169–74.
 29. Jenkins N, *et al.* Initiating insulin as part of the Treating to Target in Type 2 Diabetes (4-T) trial: An interview study of patients' and health professionals' experiences. *Diabetes Care* 2010;33(10):2178–80.
 30. Joy SV. Clinical pearls and strategies to optimize patient outcomes. *Diabetes Educ* 2008;34(Suppl 3):54S–59S.
 31. Alam R, *et al.* An updated meta-analysis to assess the effectiveness of psychological interventions delivered by psychological specialists and generalist clinicians on glycaemic control and on psychological status. *Patient Educ Couns* 2009;75(1):25–36.



Appendix 1. Summary of 60 studies that investigated psychological insulin resistance (PIR)

| Study/reference | Study design | Term used for PIR | Factors in insulin naïve patients | Factors in insulin treated patients | Factors in health care providers | Discussed strategies |
|--|--------------|--|-----------------------------------|-------------------------------------|----------------------------------|----------------------|
| 1 Jenkins N, <i>et al.</i> Initiating insulin as part of the Treating to Target in Type 2 Diabetes (4-T) trial: An interview study of patients' and health professionals' experiences. <i>Diabetes Care</i> 2010;33(10):2178–80. | QUAL | Psychological insulin receptiveness | x | – | x | x |
| 2 Nam S, <i>et al.</i> Factors associated with psychological insulin resistance in individuals with type 2 diabetes. <i>Diabetes Care</i> 2010;33(8):1747–9. | CS, OBS | Reluctance to use IT | x | – | – | x |
| 3 Karter AJ, <i>et al.</i> Barriers to Insulin Initiation. <i>Diabetes Care</i> 2010;33(4):733–5. | COMP | Failure to initiate IT | x | – | – | x |
| 4 Weinger K, Beverly EA. Barriers to achieving glycemic targets: who omits insulin and why? <i>Diabetes Care</i> 2010;33(2):450–2. | ED | Insulin injections omission | – | x | – | x |
| 5 Peyrot M, <i>et al.</i> Correlates of insulin injection omission. <i>Diabetes Care</i> 2010;33(2):240–5. | CS | Insulin injections omission | – | x | – | x |
| 6 Ahmed US, <i>et al.</i> Barriers in initiating insulin therapy in a South Asian Muslim community. <i>Diabet Med</i> 2010;27(2):169–74. | CS, COMP | Barriers in initiating IT | x | x | – | x |
| 7 Brod M, <i>et al.</i> Psychological insulin resistance: patient beliefs and implications for diabetes management. <i>Qual Life Res</i> 2009;18(1):23–32. | RW | Psychological opposition towards insulin use | x | x | – | x |
| 8 Fu AZ, <i>et al.</i> Impact of fear of insulin or fear of injection on treatment outcomes of patients with diabetes. <i>Curr Med Res Opin</i> 2009;25(6):1413–20. | RW | Fear of insulin/injections | x | x | – | – |
| 9 Lerman I, <i>et al.</i> Nonadherence to insulin therapy in low-income, type 2 diabetic patients. <i>Endocr Pract</i> 2009;15(1):41–6. | CS | Psychosocial barriers to insulin use | x | x | – | x |
| 10 Rubin RR, <i>et al.</i> Barriers to insulin injection therapy: patient and health care provider perspectives. <i>Diabetes Educ</i> 2009;35(6):1014–22. | COMP | Resistance to optimal IT | – | x | x | x |
| 11 Makine C, <i>et al.</i> Symptoms of depression and diabetes-specific emotional distress are associated with a negative appraisal of insulin therapy in insulin-naïve patients with Type 2 diabetes mellitus. A study from the European Depression in Diabetes [EDID] Research Consortium. <i>Diabet Med</i> 2009;26(1):28–33. | CS | Negative appraisal of IT | x | – | – | – |
| 12 Hayes RP, <i>et al.</i> Primary care physician beliefs about insulin initiation in patients with type 2 diabetes. <i>Int J Clin Pract</i> 2008;62(6):860–8. | OBS | Reluctance to initiate IT | – | – | x | x |
| 13 Joy SV. Clinical pearls and strategies to optimize patient outcomes. <i>Diabetes Educ</i> 2008;34(Suppl 3):54S–59S. | RW | Reluctance to initiate IT | x | x | x | x |
| 14 Khan H, <i>et al.</i> Prevalence and reasons for insulin refusal in Bangladeshi patients with poorly controlled Type 2 diabetes in East London. <i>Diabet Med</i> 2008;25(9):1108–11. | QUAL | Insulin refusal | x | – | – | x |
| 15 Larkin ME, <i>et al.</i> Measuring psychological insulin resistance: barriers to insulin use. <i>Diabetes Educ</i> 2008;34(3):511–7. | CS | Barriers to insulin use | x | – | – | x |
| 16 Sharma SK, <i>et al.</i> Lessons in initiating insulin in clinical practice. <i>Diabetes Res Clin Pract</i> 2008;81(S):S16–S22. | RW | PIR | x | – | – | x |
| 17 Funnell MM. Quality of Life and Insulin Therapy in Type 2 Diabetes Mellitus. <i>Insulin</i> 2008;3(1):31–6. | RW | Barriers to insulin use | – | x | – | x |
| 18 Cefalu WT, <i>et al.</i> Patients' Perceptions of Subcutaneous Insulin in the OPTIMIZE Study: A Multicenter Follow-Up Study. <i>Diabetes Technol Therapeutics</i> 2008;10(1):25–38. | SURV | Barriers in implementing IT | – | x | – | x |
| 19 Blonde L. Easing the transition to insulin therapy in people with type 2 diabetes. <i>Diabetes Educ</i> 2007;33(Suppl 7):232S–240S. | RW | Barriers to IT | – | – | x | x |

Notes: ED = editorial; IT = insulin treatment; OBS = observational; CS = cross-sectional; QUAL = qualitative; RW = review; COMP = comparative; DESC = descriptive; SURV = survey; PP = perspectives in practice; Scale = scale construction; MA = meta-analysis.

**Appendix 1.** Summary of 60 studies that investigated psychological insulin resistance (continued from previous page)

| Study/reference | Study design | Term used for PIR | Factors in insulin naïve patients | Factors in insulin treated patients | Factors in health care providers | Discussed strategies |
|--|--------------|--|-----------------------------------|-------------------------------------|----------------------------------|----------------------|
| 20 Campos C. Addressing cultural barriers to the successful use of insulin in Hispanics with type 2 diabetes. <i>South Med J</i> 2007;100(8):812–20. | CS | Barriers in IT initiation or intensification | x | x | – | x |
| 21 Haas L. Psychological insulin resistance: scope of the problem. <i>Diabetes Educ</i> 2007;33(Suppl 7):228S–231S. | RW | PIR, delaying IT | x | – | x | – |
| 22 Haas L. Provider psychological insulin resistance: easing the transition. <i>Diabetes Educ</i> 2007;33(Suppl 7):245S–247S. | RW | Resistance to IT initiation | – | – | x | x |
| 23 Kruger DF. Tying it all together: matching insulin regimens to individual patient needs. <i>Diabetes Educ</i> 2007;33(Suppl 4):91S–95S. | RW | Barriers to insulin use | x | – | x | x |
| 24 Nakar S, et al. Transition to insulin in Type 2 diabetes: family physicians' misconception of patients' fears contributes to existing barriers. <i>J Diabetes Complicat</i> 2007;21(4):220–6. | QUAL | Delay/prevention of IT initiation | x | x | x | x |
| 25 Nichols GA, et al. Delay of insulin addition to oral combination therapy despite inadequate glycemic control: delay of insulin therapy. <i>J Gen Intern Med</i> 2007;22(4):453–8. | LONG, OBS | Delay of IT initiation | – | – | – | – |
| 26 Odegard PS, Capoccia K. Medication taking and diabetes: a systematic review of the literature. <i>Diabetes Educ</i> 2007;33(6):1014–31. | MA | Adherence to IT | x | x | x | – |
| 27 Oliveria SA, et al. Barriers to the initiation of, and persistence with, insulin therapy. <i>Curr Med Res Opin</i> 2007;23(12):3105–12. | QUAL | Barriers to initiation and persistence with IT | x | x | – | – |
| 28 Peragallo-Dittko V. Removing barriers to insulin therapy. <i>Diabetes Educ</i> 2007;33(Suppl 3):60S–65S. | RW | Barriers to insulin use, PIR | x | – | x | x |
| 29 Petrak F, et al. Development and validation of a new measure to evaluate psychological resistance to insulin treatment. <i>Diabetes Care</i> 2007;30(9):2199–204. | Scale | Psychological barriers to IT | x | – | – | – |
| 30 Polonsky W. Psychological insulin resistance: the patient perspective. <i>Diabetes Educ</i> 2007;33(Suppl 7):241S–244S. | RW | Refusing IT, barriers in initiation | x | – | x | x |
| 31 Snoek FJ, et al. Development and validation of the insulin treatment appraisal scale (ITAS) in patients with type 2 diabetes. <i>Health Qual Life Outcomes</i> 2007;5:69. | Scale | Negative appraisal of IT | x | x | – | – |
| 32 Brunton SA, et al. Overcoming Psychological Barriers to Insulin Use in Type 2 Diabetes. <i>Clin Cornerstone</i> 2006;8(2):S19–S26. | PP | Reluctance to initiate IT | x | – | x | x |
| 33 Davis SN. Psychological Insulin Resistance: Overcoming Barriers to Starting Insulin Therapy. <i>Diabetes Educ</i> 2006;32(Suppl 4):146S–152S. | PP | Psychological barriers to initiate IT | x | – | x | x |
| 34 Meece J. Dispelling myths and removing barriers about insulin in type 2 diabetes. <i>Diabetes Educ</i> 2006;32(Suppl 1):9S–18S. | PP | Avoidance of IT initiation | x | – | – | x |
| 35 Siminerio L. Challenges and strategies for moving patients to injectable medications. <i>Diabetes Educ</i> 2006;32(Suppl 2):82S–90S. | PP | Psychological barriers to IT | x | x | – | x |
| 36 Blaha MJ, Elasy TA. Adherence to insulin and the risk of glucose deterioration. <i>Diabetes Care</i> 2006;29(8):1982–3. | OBS | Omission of IT | – | – | – | – |
| 37 Carver C. Insulin treatment and the problem of weight gain in type 2 diabetes. <i>Diabetes Educ</i> 2006;32(6):910–7. | PP | Reluctance to initiate or follow IT | x | – | – | x |
| 38 Ho EY, James J. Cultural barriers to initiating insulin therapy in Chinese people with type 2 diabetes living in Canada. <i>Canadian J Diabetes</i> 2006;30(4):390–6. | QUAL | Barriers in initiating IT | x | – | – | – |

Notes: ED = editorial; IT = insulin treatment; OBS = observational; CS = cross-sectional; QUAL = qualitative; RW = review; COMP = comparative; DESC = descriptive; SURV = survey; PP = perspectives in practice; Scale = scale construction; MA = meta-analysis.



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| Study/reference | Study design | Term used for PIR | Factors in insulin naive patients | Factors in insulin treated patients | Factors in health care providers | Discussed strategies |
|---|--------------|---------------------------------------|-----------------------------------|-------------------------------------|----------------------------------|----------------------|
| 39 Haque M, <i>et al.</i> Barriers to initiating insulin therapy in patients with type 2 diabetes mellitus in public-sector primary health care centres in Cape Town. <i>S Afr Med J</i> 2005;95(10):798–802. | QUAL | Barriers in initiating IT | x | – | x | x |
| 40 Peyrot M, <i>et al.</i> Resistance to insulin therapy among patients and providers: results of the cross-national Diabetes Attitudes, Wishes, and Needs (DAWN) study. <i>Diabetes Care</i> 2005;28(11):2673–9. | CS | Resistance to IT, delay of initiation | x | – | x | x |
| 41 Phillips P. Type 2 Diabetes – failure, blame and guilt in the adoption of insulin therapy. <i>Rev Diabet Stud</i> 2005;2(1):35–9. | Case report | Resistance to starting IT | x | – | x | x |
| 42 Hendra T.J. Review: Diabetes and insulin therapy in older people. <i>Br J Diabetes Vascular Dis</i> 2005;5(1):19–23. | RW | Barriers in initiating IT | x | – | x | x |
| 43 Polonsky WH, <i>et al.</i> Psychological insulin resistance in patients with type 2 diabetes: the scope of the problem. <i>Diabetes Care</i> 2005;28(10):2543–5. | SURV | Delay/reluctance to IT initiation | x | – | – | – |
| 44 Bogatean MP, Hâncu N. People with type 2 diabetes facing the reality of starting insulin therapy: factors involved in psychological insulin resistance. <i>Pract Diabetes Int</i> 2004;21(7):247–52. | QUAL | Refusal/delay of IT initiation | x | – | – | – |
| 45 Funnell MM, <i>et al.</i> Self-management support for insulin therapy in type 2 diabetes. <i>Diabetes Educ</i> 2004;30(2):274–80. | PP | Reluctance to initiate IT | x | – | x | x |
| 46 Polonsky WH, Jackson RA. What's so tough about taking insulin? Addressing the problem of psychological insulin resistance in type 2 diabetes. <i>Clin Diabetes</i> 2004;(22):147–50. | PP | Refusal/reluctance to initiate IT | x | – | x | x |
| 47 Skinner TC. Psychological barriers. <i>Eur J Endocrinology</i> 2004;151:13–17. | PP | Reluctance to initiate IT | x | – | – | x |
| 48 Shiu AT, <i>et al.</i> Social stigma as a barrier to diabetes self-management: Implications for multilevel interventions. <i>J Clin Nurs</i> 2003;12(1):149–50. | QUAL | Barriers to insulin injections | – | x | – | x |
| 49 Korytkowski M. When oral agents fail: practical barriers to starting insulin. <i>Int J Obes Relat Metab Disord</i> 2002;26(Suppl 3):S18–24. | PP | Barriers in initiating IT | x | – | x | x |
| 50 Riddle MC. The underuse of insulin therapy in North America. <i>Diabetes Metab Res Rev</i> 2002;18(Suppl 3):S42–49. | PP | Barriers in initiating IT | – | – | x | x |
| 51 Mollema ED, <i>et al.</i> Phobia of self-injecting and self-testing in insulin-treated diabetes patients: opportunities for screening. <i>Diabet Med</i> 2001;18(8):671–4. | Scale | Avoiding of self-injecting | x | – | – | – |
| 52 Snoek F. Psychological Insulin Resistance. What do patients and providers fear most? <i>Diabetes Voice</i> 2001;46(3):26–8. | PP | Reluctance to start/intensify IT | x | x | x | – |
| 53 Mollema ED, <i>et al.</i> Diabetes Fear of Injecting and Self-Testing Questionnaire: a psychometric evaluation. <i>Diabetes Care</i> 2000;23(6):765–9. | Scale | Fear of self-injecting | – | x | – | – |
| 54 Rubin RR, Peyrot M. Psychological issues and treatments for people with diabetes. <i>J Clin Psychol</i> 2001;57(4):457–78. | PP | Fear of taking insulin | x | – | – | x |
| 55 Sigurdardóttir AK. Nurse specialists' perceptions of their role and function in relation to starting an adult diabetic on insulin. <i>J Clin Nurs</i> 1999;8(5):512–8. | QUAL | Perceptions on initiating IT | – | – | x | – |
| 56 Zambanini A, <i>et al.</i> Injection related anxiety in insulin-treated diabetes. <i>Diabetes Res Clin Pract</i> 1999;46(3):239–46. | CS | Avoiding insulin injections | – | x | – | – |
| 57 Bryden KS, <i>et al.</i> Eating habits, body weight, and insulin misuse. A longitudinal study of teenagers and young adults with type 1 diabetes. <i>Diabetes Care</i> 1999; 22(12):1956–60. | CS | Insulin injections omission | – | x | – | – |

Notes: ED = editorial; IT = insulin treatment; OBS = observational; CS = cross-sectional; QUAL = qualitative; RW = review; COMP = comparative; DESC = descriptive; SURV = survey; PP = perspectives in practice; Scale = scale construction; MA = meta-analysis.


Appendix 1. Summary of 60 studies that investigated psychological insulin resistance (continued from previous page)

| Study/reference | Study design | Term used for PIR | Factors in insulin naïve patients | Factors in insulin treated patients | Factors in health care providers | Discussed strategies |
|--|--------------|---|-----------------------------------|-------------------------------------|----------------------------------|----------------------|
| 58 Hunt LM, <i>et al.</i> NIDDM patients' fears and hopes about insulin therapy. The basis of patient reluctance. <i>Diabetes Care</i> 1997;20(3):292–8. | QUAL | Reluctance, unwillingness to take insulin | x | – | – | x |
| 59 Leslie CA, <i>et al.</i> Psychological insulin resistance: A missed diagnosis? <i>Diabetes Spectrum</i> 1994;7(7):52–7. | PP | Reluctance, unwillingness to take insulin | x | – | – | – |
| 60 Polonsky WH, <i>et al.</i> Insulin omission in women with IDDM. <i>Diabetes Care</i> 1994; 17(10):1178–85. | CS | Insulin injections omission | – | x | – | – |

Notes: ED = editorial; IT = insulin treatment; OBS = observational; CS = cross-sectional; QUAL = qualitative; RW = review; COMP = comparative; DESC = descriptive; SURV = survey; PP = perspectives in practice; Scale = scale construction; MA = meta-analysis.