Resistance to Insulin Therapy Among Patients and Providers

Results of the cross-national Diabetes Attitudes, Wishes, and Needs (DAWN) study

MARK PEYROT, PHD[1,2]
RICHARD R. RUBIN, PHD[2]
TORSTEN LAURITZEN, MD[3]
SOREN E. SKOVLUND, MSC[4]
FRANK J. SNOEK, PHD[5]
DAVID R. MATTHEWS, MD[6]
RÜDIGER LANDGRAF, MD[7]
LINE KLEINEBREIL[8]
ON BEHALF OF THE INTERNATIONAL DAWN ADVISORY PANEL*

OBJECTIVE — To examine the correlates of patient and provider attitudes toward insulin therapy.

RESEARCH DESIGN AND METHODS — Data are from surveys of patients with type 2 diabetes not taking insulin (n = 2,061) and diabetes care providers (nurses = 1,109; physicians = 2,681) in 13 countries in Asia, Australia, Europe, and North America. Multiple regression analysis is used to identify correlates of attitudes toward insulin therapy among patients, physicians, and nurses.

RESULTS — Patient and provider attitudes differ significantly across countries, controlling for individual characteristics. Patients rate the clinical efficacy of insulin as low and would blame themselves if they had to start insulin therapy. Self-blame is significantly lower among those who have better diet and exercise adherence and less diabetes-related distress. Patients who are not managing their diabetes well (poor perceived control, more complications, and diabetes-related distress) are significantly more likely to see insulin therapy as potentially beneficial. Most nurses and general practitioners (50–55%) delay insulin therapy until absolutely necessary, but specialists and opinion leaders are less likely to do so. Delay of insulin therapy is significantly less likely when physicians and nurses see their patients as more adherent to medication or appointment regimens, view insulin as more efficacious, and when they are less likely to delay oral diabetes medications.

CONCLUSIONS — Patient and provider resistance to insulin therapy is substantial, and for providers it is part of a larger pattern of reluctance to prescribe blood glucose–lowering medication. Interventions to facilitate timely initiation of insulin therapy will need to address factors associated with this resistance.

Diabetes Care 28:2673–2679, 2005

Type 2 diabetes is characterized by defects in both insulin secretion and insulin action. The defect in insulin secretion seems to be progressive; newly diagnosed patients in the U.K. Prospective Diabetes Study (1) had 50% of normal insulin secretion, and they had <25% of normal insulin secretion 6 years after diagnosis. As a consequence, good glycemic control in type 2 diabetes often requires insulin supplementation therapy (2). Unfortunately, many patients with type 2 diabetes who could benefit from insulin therapy do not receive it or do not receive it in a timely manner (3–6). Part of this gap appears to be attributable to resistance to taking insulin among patients and resistance to prescribing insulin among health care providers. This resistance is based on a variety of factors, primarily beliefs and perceptions regarding diabetes and its treatment, the nature and consequences of insulin therapy, and how others would regard insulin therapy (7–14). Treatment guidelines that have advocated insulin therapy only if all other treatment strategies have failed also may have contributed.

Resistance to insulin therapy in patients has been examined in several studies, although none with large samples. An early study (15) reported that more than three-quarters of patients with type 2 diabetes who were about to initiate insulin therapy considered it a "severe crisis" in their illness. Several studies (15–26) have identified patient attitudes that contribute to resistance to or acceptance of insulin therapy. Attitudes found to contribute to resistance to insulin therapy include the beliefs that taking insulin *1*) leads to poor outcomes including hypoglycemia, weight gain, and complications; *2*) means the patient's diabetes is worse and the patient has failed; *3*) means life will be more restricted and people will treat the patient

From the [1]Department of Sociology, Loyola College, Baltimore, Maryland; the [2]Department of Medicine, Johns Hopkins University, Baltimore, Maryland; the [3]Department of Medicine, Aarhus University, Aarhus, Denmark; [4]Stakeholder Relations, Novo Nordisk, Bagsværd, Denmark; the [5]Department of Medical Psychology, Vrije University, Amsterdam, the Netherlands; the [6]Center for Diabetes, Endocrinology, and Metabolism, University of Oxford, Oxford, U.K.; the [7]Department of Medicine, University of Munich, Munich, Germany; and the [8]Department of Medicine, Jean Verdier Hospital, Bondy, France.

Address correspondence and reprint requests to Mark Peyrot, PhD, Professor, Department of Sociology, Loyola College, 4501 North Charles St., Baltimore, MD 21210-2699. E-mail: mpeyrot@loyola.edu.

Received for publication 3 April 2005 and accepted in revised form 2 August 2005.

*Members of the DAWN Advisory Panel can be found in the APPENDIX.

M.P. has received honoraria/consulting fees from Novo Nordisk and MannKind Biopharmaceuticals and has received grant research support from Novo Nordisk. R.R.R. has been on an advisory board for Amylin, MannKind Biopharmaceuticals, Novo Nordisk, Novo Nordisk DK, and Takeda; has received honoraria from Novo Nordisk, Eli Lilly, and Takeda; has received consulting fees from Amylin, MannKind Biopharmaceuticals, Novo Nordisk, Novo Nordisk DK, Takeda, and Medtronic MiniMed; and has received grant/research support from MannKind Biopharmaceuticals, Novo Nordisk, Novo Nordisk DK, and Medtronic MiniMed. T.L. has been on an advisory panel for Novo Nordisk; has received honoraria/consulting fees from Novo Nordisk and AstraZeneca; and has received grant/research support from Novo Nordisk, AstraZeneca, Pfizer, Servier, and GlaxoSmithKline. F.J.S. has received honoraria/consulting fees from Novo Nordisk. R.L. has been on an advisory panel for Novo Nordisk Pharma Germany, Lilly Deutschlund, GlaxoSmithKline, and Novartis and has received honoraria/consulting fees from Lilly Deutschlund, Merck, Novo Nordisk, Lilly, Sanofi-Aventis, and GlaxoSmithKline.

Abbreviations: DAWN, Diabetes Attitudes, Wishes, and Needs; SMBG, self-monitoring of blood glucose.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

differently; and *4*) will not make diabetes easier to manage. Attitudes facilitating acceptance of insulin therapy include the beliefs that taking insulin *1*) leads to good short-term outcomes (e.g., lower blood glucose levels, with benefits such as feeling better and fewer symptoms) as well as long-term benefits (e.g., prolonged life and lower risk of complications), *2*) is often required because of natural disease progression, and *3*) could be easier with some available delivery systems. Patients whose health care provider recommended insulin therapy had more positive attitudes toward insulin (16,18,23).

With few exceptions (27,28), little is known about the factors related to prescribing diabetes medications, and insulin specifically, though there is substantial research about the correlates of provider willingness to prescribe medications in general. Specialists tend to prescribe more than general practitioners (29,30). Some physicians have a higher propensity to prescribe because they prefer medication over other forms of treatment (31–33). Physician beliefs about specific medications (e.g., efficacy, side effects, cost) are also associated with prescribing (34,35). And provider beliefs about patient attitudes toward medication are associated with level of prescribing (36,37).

Finally, attitudes toward insulin therapy may differ by country, perhaps as a function of cultural and health care system factors. International comparisons suggest that there are systematic differences among countries that are worthy of study (38).

The current report describes patient and provider attitudes toward insulin therapy and their correlates based on data from a large multinational study. We examine the degree to which providers' tendency to delay insulin therapy is associated with general orientation toward prescribing blood glucose–lowering agents, specific beliefs about insulin therapy, and perceptions of patient attitudes toward insulin. We also examine the degree to which patient perceptions of insulin's benefits and self-blame for needing to initiate insulin therapy are associated with perceived diabetes severity (control and complications), diabetes-related emotional distress, adherence to self-care recommendations, and quality of the patient-provider relationship. We also consider differences among countries in patient and provider resistance to initiating insulin therapy.

RESEARCH DESIGN AND METHODS

— Data are from the multinational Diabetes Attitudes, Wishes, and Needs (DAWN) study (38,39). All data are self-reports gathered during 2001 by structured interviews conducted face to face or by telephone (depending on telephone availability). Interviews took 30–50 min to complete. Interviews were conducted in 11 regions (representing 13 countries): Australia, France, Germany, India, Japan, the Netherlands, Poland, Scandinavia (divided equally among Sweden, Denmark, and Norway), Spain, the U.K., and the U.S.

The study was conducted with three independent samples. Two samples consisted of providers who were treating at least five diabetic patients per month; only one provider was selected from a practice. The physician sample consisted of 2,705 respondents, with a quota of 250 per region, 200 in primary care and 50 specialists (endocrinologists and diabetologists with 2 years experience and treating >50 patients per month). Of this sample, 2,681 treated patients with type 2 diabetes and were used in the analyses (Table 1). The nurse sample consisted of 1,122 respondents, with a quota of 100 per region, 50 specialists (those caring for 50 or more patients with diabetes a month), and 50 generalists. Of this sample, 1,109 treated patients with type 2 diabetes and were used in the analyses (Table 1).

The third sample consisted of adults with self-reported type 1 or type 2 diabetes, with a quota of 500 per region (Table 2). Sample quotas were established to obtain equal numbers of people with self-reported type 1 and type 2 diabetes. This study examines only the 2,061 respondents who were not currently using insulin.

A variety of sampling frames was used in different countries to generate heterogeneous samples from the entire country (except India, where the sample was limited to five regions). Patients were recruited via random-digit dialing, clinic and practice rosters, and survey panels, supplemented by advertisements and snowball recruiting. Providers were recruited from professional directories and various listings.

Provider measures

The primary dependent variable for providers was insulin initiation delay ("I prefer to delay the initiation of insulin until it is absolutely essential"). In addition to age, sex, practice location, and years in practice, the following provider characteristics were assessed: professional roles (whether the provider was a specialist or primary care provider and the degree to which she/he was an opinion leader); percent of diabetic patients treated who had type 2 diabetes; perceived patient psychological distress; perceived patient adherence to diet, exercise, medication, self-monitoring of blood glucose (SMBG), and appointment scheduling recommendations; providers' perceptions of patient attitudes toward insulin; provider beliefs about insulin efficacy and financial barriers to insulin therapy; and provider attitude toward delay of oral hypoglycemic medication. Provider characteristics and details concerning the measures appear in Table 1.

Patient measures

The primary dependent variables for patients were two attitudes toward insulin therapy: perceived efficacy of insulin ("Using insulin would help me to manage my diabetes better") and self-blame for needing insulin ("Starting insulin would mean that I have not followed my treatment recommendations properly"). In addition to demographic and disease characteristics, other patient characteristics assessed include self-reported adherence to medication, SMBG appointment scheduling, diet, and exercise recommendations; perceived diabetes control; diabetes-related distress; and quality of relationship with provider. Patient characteristics and details concerning the measures appear in Table 2.

Statistical analysis

Statistical analysis used multiple regression models incorporating effects for country and respondent characteristics. This strategy identified country differences after adjusting for differences in the composition of country samples. The U.S. was the reference category for all analyses; country coefficients are interpreted as differences from the U.S. Analyses were conducted separately for each type of respondent (physicians, nurses, and patients). For both patient and provider analyses, country and individual variables were forced into the model with the following exceptions. For patient analyses, self-care adherence, perceived diabetes control, distress, and patient-provider relationship were entered only if significantly ($P < 0.05$) related to insulin efficacy or self-blame. For provider analyses, perception of patient attributes (ad-

Table 1—*Respondent characteristics for providers*

	Physicians		Nurses	
	n	Means ± SD or %	*n*	Means ± SD or %
Sex	2,681		1,109	
Men	1,944	72.5	54	4.9
Women	737	27.5	1,055	95.1
Age	2,676	46.16 ± 9.78	1,092	41.00 ± 8.60
Years in practice	2,582	16.05 ± 9.57	1,107	10.91 ± 7.43
Professional role				
Specialist*	2,681	22.9	1,109	53.1
Opinion leader†	2,680	0.22 ± 0.28	1,109	0.26 ± 0.26
Percent with type 2 diabetes‡	2,681	67.12 ± 17.77	1,109	62.94 ± 20.31
Practice location	2,669		1,109	
Rural	388	14.5	189	17.1
Suburban	422	15.7	156	14.1
Small urban	485	18.1	180	16.3
Large urban	1,374	51.2	582	52.6
Patient adherence to recommendations§				
Medication	2,655	3.44 ± 0.56	1,066	3.60 ± 0.47
Appointments	2,540	3.43 ± 0.57	1,033	3.43 ± 0.59
SMBG	2,607	3.01 ± 0.71	1,068	3.10 ± 0.68
Diet	2,651	2.83 ± 0.59	1,084	2.92 ± 0.57
Exercise	2,650	2.65 ± 0.65	1,076	2.64 ± 0.65
Patient psychological problems¶	2,612	23.94 ± 16.74	1,040	30.97 ± 27.55
Patient attitudes toward insulin‖				
Worry	2,670	60.17 ± 30.56	1,092	62.40 ± 30.32
Self-blame	2,670	36.04 ± 29.53	1,077	38.90 ± 32.05
Attitudes toward insulin#				
Efficacy	2,566	3.60 ± 1.63	1,011	3.67 ± 1.60
Cost a barrier	2,649	2.80 ± 1.67	1,063	2.99 ± 1.69
Delay oral medication**	2,654	3.16 ± 1.73	1,048	3.45 ± 1.75
Delay insulin††	2,651	3.76 ± 1.72	1,057	3.66 ± 1.80

*For India, approximately half of the physicians (rather than the quota of 20%) were classified as diabetes specialists because those who treated >50 diabetes patients a month, initiated insulin, and accepted diabetes referrals from other physicians were classified as specialists in India. †Six items indicating how often the respondent spoke at diabetes meetings or wrote for audiences of patients or providers (no or seldom = 0, sometimes or often = 1; measure = mean of item scores [α reliability = 0.72 for physicians, 0.66 for nurses]). ‡Percent of diabetic patients treated by provider who have type 2 diabetes. §Ratings of how well provider's typical type 2 diabetic patient adhered to treatment recommendations (never = 1 to completely = 4). ¶Percentage of type 2 diabetic patients suffering from stress, anxiety, depression, denial, and burnout (0–100; measure = mean of item scores [α reliability = 0.82 for physicians and nurses]). ‖Percentage of type 2 diabetic patients who would worry about starting insulin therapy or think that starting insulin means not having followed treatment recommendations properly (none or few = 0, less than half = 33.3, more than half = 66.7, most or all = 100). #Earlier introduction of insulin would reduce long-term costs of diabetes care; cost of insulin therapy is a barrier to effective management (fully disagree = 1 to fully agree = 6). **Prefer to delay initiation of oral hypoglycemic therapy until it is absolutely necessary (fully disagree = 1 to fully agree = 6). ††Prefer to delay initiation of insulin therapy until it is absolutely necessary (fully disagree = 1 to fully agree = 6).

herence, distress, and insulin attitudes) and provider attitudes were entered only if significantly ($P < 0.05$) related to delay. For these exceptions, if a variable is in the final model, it was significant upon entry; any reduction in the relationship is due to mediation by a variable entered subsequently. Variables forced into the models that later became nonsignificant are indicated by a symbol in the tables. Unstandardized coefficients can be compared across models, and their significance levels are presented; standardized coefficients are presented so that the magnitude of relationships within each model can be compared. All analyses were performed with SPSS version 11.5 (SPSS, Chicago, IL).

RESULTS — Respondent characteristics for providers are shown in Table 1. Physicians were mostly men, while nurses were almost exclusively women. Physicians and nurses had similar views of patient adherence and patient attitudes toward insulin therapy, as well as similar attitudes toward insulin and oral hypoglycemic medication. Delay of insulin and oral therapy was high for both respondent groups, with insulin delay being higher.

Respondent characteristics for patients are shown in Table 2. Patients were on average middle aged, almost equally divided between men and women, and had diabetes for an average of ~8 years. Patients reported higher levels of adherence for medication and appointments than for diet and exercise. Belief in the potential efficacy of insulin was low, and self-blame for having to take insulin was high.

Provider attitudes

Results for the analysis of provider orientation toward delay of insulin therapy are presented in Table 3. Total variance explained was 34% (physicians) and 54% (nurses). Delaying was higher among providers in the U.S. than in most other countries. U.S. physicians were significantly more disposed to delay insulin therapy than physicians in all other countries, except for India and Japan. U.S. nurses were significantly more disposed to delay than nurses in Australia, Scandanavia, and the U.K.; Only Indian nurses were significantly more disposed than U.S. nurses to delay insulin therapy.

Delay of insulin therapy was significantly less among specialists and opinion leaders and those who believed insulin was efficacious. Delay of oral hypoglycemic medication was the strongest correlate of insulin therapy delay and accounted for most of the explained variance (20% for physicians and 30% for nurses). Physicians (but not nurses) with higher insulin delay reported significantly higher levels of patient adherence to recommendations for medication. Nurses (but not physicians) with higher insulin delay reported a significantly lower percentage of their diabetic patients as having type 2 diabetes. For neither type of provider was insulin delay associated with perceived patient self-blame for insulin therapy.

Patient attitudes

Results for the analysis of patient attitudes toward insulin therapy are presented in Table 4. The total explained variance in perceived clinical efficacy was 14%. The total explained variance in self-blame was 9%.

U.S. patients reported lower belief in

Table 2—*Respondent characteristics for patients*

	n	Means ± SD or %
Sex	2,056	
Men	969	47.0%
Women	1,087	52.7%
Age (years)	2,060	59.16 ± 11.88
Age education completed	1,983	
≤14	407	19.7%
15–19	985	47.8%
≥20	591	28.7%
Residential location	2,055	
Rural	409	19.9%
Suburban	419	20.3%
Urban	377	18.3%
Large urban	850	41.2%
Duration of diabetes (years)	2,058	8.25 ± 7.69
Complications	2,061	1.34 ± 0.79
Adherence to recommendations*		
Medication	1,825	3.32 ± 1.15
Appointments	1,860	3.42 ± 0.96
SMBG	1,713	3.12 ± 1.12
Diet	2,012	3.08 ± 1.12
Exercise	1,962	2.96 ± 0.99
Perceived control†	2,048	2.54 ± 1.16
Diabetes distress‡	2,061	1.94 ± 0.70
Relationship with provider§	2,055	3.30 ± 0.67
Attitudes toward insulin initiation¶		
Efficacy	1,610	1.95 ± 1.01
Self-blame	1,818	2.54 ± 1.16

*Success following treatment recommendations (never = 1 to completely = 4). †Extent diabetes is in control (not at all = 1 to to a great extent = 4). ‡Four items: stressed because of diabetes, constant fear diabetes is getting worse, coping getting more difficult, and burned out by diabetes (fully disagree = 1 to fully agree = 4; measure = mean of all items [α reliability = 0.68]). §Three items: fully involved in treatment decisions, doctor spends enough time with me, and good relationship with diabetes care providers (fully disagree = 1 to fully agree = 4; measure = mean of all items [α reliability = 0.65]). ¶Taking insulin will help me manage diabetes better; starting insulin means not having followed treatment recommendations properly (fully disagree = 1 to fully agree = 4).

insulin efficacy than patients from all other countries and significantly lower belief than patients from Germany, India, Japan, Scandinavia, and Spain. Patients who reported high belief in insulin efficacy were significantly younger and had more complications. They also reported significantly poorer relationships with their providers, poorer perceived control, more SMBG adherence, and more diabetes distress.

U.S. patients reported more self-blame for insulin therapy than patients from all other countries and significantly more than patients from Australia, Germany, India, and the Netherlands. Patients who reported higher levels of self-blame for insulin therapy were significantly younger and had less duration of diabetes. They also reported significantly less exercise adherence and more diabetes distress.

CONCLUSIONS

Provider attitudes

Physicians and nurses in a given country tended to have similar attitudes toward delay of insulin therapy. For example, the belief that insulin therapy should be delayed until absolutely necessary was strongly held in the U.S. among both physicians and nurses; only in India was the tendency to delay higher (significantly so for both physicians and nurses before controlling for attitudes toward delaying oral medication). Although we cannot link specific patients to their own providers, this pattern closely resembles that observed for patients' attitudes toward insulin; U.S. patients were among the lowest in perceived insulin efficacy and among the highest in insulin self-blame. This suggests that beliefs about insulin are related to the cultures and health care systems of the different countries, and understanding beliefs about insulin will require an understanding of how these factors operate.

Delay in prescribing oral blood glucose–lowering medication had the strongest relationship with delay in prescribing insulin. Providers tend to have a general orientation toward using glucose-lowering medications in managing diabetes. This orientation could reflect a lack of awareness about the need to keep glucose levels as close to normal as possible or it could reflect a more general orientation toward delayed prescribing of other medications for patients with diabetes or medications for other disorders. In any case, we know that propensity to use medications is an important determinant of prescribing behavior (30–32), which suggests that efforts to facilitate the timely prescription of insulin may need to address the more general reluctance to prescribe diabetes medication (or medication generally).

Clinical efficacy was the insulin-specific belief most strongly associated with provider inclination to delay insulin therapy. The scores on this measure were relatively low (just over half of physicians and nurses agree that insulin can have a positive impact on care), suggesting that efforts to improve awareness of efficacy are required. Although this belief was not strongly related to delay, other research (33,34) suggests that attitudes toward specific medications do influence prescription decisions. We believe that a more comprehensive measure of insulin attitudes would be more strongly predictive of insulin delay.

Specialists, opinion leaders, and those who treat a higher percentage of patients with type 2 diabetes were less inclined than nonspecialists to delay initiation of insulin, but belief in the benefits of insulin therapy was low among specialists and generalists alike. Specialists and opinion leaders are more likely to adopt new prescribing practices (40), and they can influence the practice behaviors of other providers (41,42), so the present study suggests that efforts to change provider beliefs might focus first on these groups.

Some have suggested that the prescribing behavior of providers is based on their perceptions of patients' expectations (36,37), while others believe that providers are relatively autonomous in their decisions and may not be sensitive to the wants and needs of their patients. We

Table 3—*Regression analysis of delay in initiating insulin treatment*

	Physicians		Nurses	
Variable	Unstandardized coefficient	Standardized coefficient	Unstandardized coefficient	Standardized coefficient
Australia	−0.498*	−0.084	−0.504†	−0.080
France	−0.604*	−0.102	−0.118	−0.019
Germany	−0.476*	−0.080	−0.322‡	−0.052
India	0.009§	0.002	0.455¶	0.072
Japan	−0.208	−0.034	−0.247	−0.037
Netherlands	−0.776*	−0.131	−0.157	−0.026
Poland	−1.037*	−0.174	−0.015§	0.002
Scandinavia	−1.097*	−0.181	−1.050*	−0.169
Spain	−0.296¶	−0.050	−0.137§	−0.021
U.K.	−0.489*	−0.082	−0.562†	−0.092
Population density	0.036	0.024	−0.034§	−0.022
Age	0.004	0.021	−0.001	−0.004
Sex	0.022	0.006	−0.075	−0.009
Percent with type 2 diabetes	0.074	0.008	−0.503¶	−0.056
Years of practice	0.000	−0.002	0.001	0.005
Specialist	−0.372*	−0.091	−0.258†	−0.072
Opinion leader	−0.518*	−0.084	−0.325‡	−0.047
Medication adherence	0.140†	0.045	NS	NS
Appointment adherence	NS	NS	0.133‡	0.042
Delay oral medication	0.475*	0.476	0.626*	0.602
Insulin efficacy	−0.143*	−0.133	−0.110*	−0.093
Model R^2		0.335		0.535

The U.S. is the reference category for countries; country coefficients are interpreted as differences from the U.S. Mean substitution used for missing values. *$P < 0.001$; †$P < 0.01$; ‡$P < 0.10$; §$P < 0.05$ at entry; ¶$P < 0.05$. NS, not significant.

found that providers' tendency to delay insulin therapy was not strongly associated with their perception of patient beliefs about this therapy. While our findings suggest that providers' general orientation to initiating insulin therapy did not take into account patients' concerns, it is possible that a provider's perception of the concerns of a given patient may affect prescribing for that particular patient (a hypothesis that this study could not address because provider perceptions were not patient specific). In contrast to patient beliefs, patient behavior was associated with prescription practices; providers were more willing to delay insulin initiation if they saw their own typical patients as more adherent to their medication or appointment regimens. Perhaps this reflects the hope that oral medications can be used to achieve adequate control if patients will take the medication or that closer teamwork between patient and provider will obviate the near-term need for insulin. Future research will be required to understand how provider perceptions of patient adherence are related to insulin delay.

In general, providers underestimated the number of patients who blamed themselves regarding the need for insulin. Other analyses of the DAWN data indicate that patients' self-blame is associated with their greater worry about starting insulin (43). Providers can help patients who blame themselves for needing to initiate insulin therapy by making sure patients understand that diabetes is a progressive disease. Providers can also reduce self-blame as a barrier to insulin therapy if they avoid the strategy of encouraging more active self-care by pointing to insulin as a consequence of inaction. This strategy, which over half the providers in our study reported using, can make it more difficult to initiate insulin therapy subsequently.

Patient attitudes

Factors included in our study explained little variance in patients' beliefs about insulin efficacy. However, there is a pattern to the relationships observed. Belief in insulin efficacy was stronger among patients who were in more negative situations: more distress, worse control, more complications, and poorer relationships with their diabetes care providers. As patients' situations worsen, they may become more receptive to a treatment strategy they have previously avoided. Patients who perceived themselves as more adherent to SMBG also saw more benefit of insulin therapy, perhaps because more frequent monitoring made them more aware that their current regimens do not provide adequate glucose control. Alternatively, they might believe that more frequent monitoring will enable them to use insulin more effectively.

Although our study also explained little variance in patients' self-blame for needing insulin, there is a pattern to these relationships as well. Those who report lower self-blame either have a biological rationale for why they need insulin (they are older and have had diabetes longer) or they may feel that they have done what they can to avoid the need for insulin (those more adherent to exercise have lower self-blame). Results (not shown) indicate that the adherence/self-blame relationship holds true if dietary adherence is substituted for exercise adherence in the model. In addition, dietary adherence has a marginally significant relationship with self-blame ($P = 0.074$) even with exercise adherence in the model. Thus, the greater the biological risk for needing insulin and the more done to take care of his/her diabetes, the less the patient feels that she/he is at fault.

Diabetes-related distress had the strongest association with insulin self-blame (as it did with perceived benefits of insulin therapy), with greater self-blame associated with more distress. Because the data are cross-sectional, we cannot say whether they are causally related, but it is likely that there is a reciprocal relationship in which distress increases self-blame and self-blame increases distress. Further research is needed to untangle these possibilities.

Limitations and implications

This study is cross-sectional, so its results show associations not causal relationships. In addition, providers and patients in the study were not linked, so we do not know whether provider perceptions of particular patients are related to their prescribing behavior for those patients. The sampling technique might not have generated representative samples of providers and patients; this could bias our findings in unknown ways. Finally, study outcomes are attitudes, and we do not know how strongly they are related to patient and provider behaviors, let alone

Table 4—*Regression analysis of patient attitudes about initiating insulin treatment*

	Insulin efficacy		Self-blame	
Variable	Unstandardized coefficient	Standardized coefficient	Unstandardized coefficient	Standardized coefficient
Australia	−0.113*	−0.035	−0.421†	−0.112
France	0.064	0.016	0.110	0.024
Germany	0.418†	0.103	−0.477†	−0.102
India	0.276‡	0.093	−0.443†	−0.125
Japan	0.361†	0.120	0.186§	0.055
Netherlands	0.018	0.005	−0.560†	−0.123
Poland	0.019	0.005	−0.243§	−0.052
Scandinavia	0.248¶	0.065	−0.185	−0.043
Spain	0.605†	0.159	−0.091	−0.022
U.K.	0.105	0.029	0.102	0.026
Population density	0.018	0.021	−0.062¶	−0.063
Women	−0.020	−0.010	−0.028	−0.012
Age	−0.006‡	−0.068	−0.003*	−0.034
Duration of diabetes	−0.002	−0.016	−0.010‡	−0.066
Complications	0.049*	0.040	0.008	0.004
Relationship with provider	−0.080¶	−0.053	NS	NS
Perceived control	−0.154†	−0.105	NS	NS
Exercise adherence	NS	NS	−0.076‡	−0.063
SMBG adherence	0.055¶	0.056	NS	NS
Diabetes distress	0.264†	0.186	0.281†	0.171
Model R^2		0.138		0.092

Regression coefficients not shown for education, which was not significantly related to insulin attitudes. The U.S. is the reference category for countries; country coefficients are interpreted as differences from the U.S. Mean substitution used for missing values. *$P < 0.05$ at entry; †$P < 0.001$; ‡$P < 0.01$; §$P < 0.10$; ¶$P < 0.05$. NS, not significant.

clinical outcomes (such as A1C level or the development of complications). At this point, our explanations for the study's findings remain largely speculative. Still, this study suggests a number of important implications for future research, educational interventions, and clinical practice.

Future research should consider influences on providers' prescribing practices for oral hypoglycemic agents (given the strong association between these practices and insulin prescription practices). Our finding that many providers do not believe insulin can reduce the costs of diabetes care points to the need to better understand these attitudes. It would also be useful to know more about how providers interact with patients in the process of initiating insulin therapy. Finally, we need to understand what unmeasured factors account for most of the variance in patients' attitudes toward insulin therapy and why diabetes-related emotional distress is strongly associated with a belief in the benefits of insulin.

Our findings suggest that educational interventions to make initiating therapy easier should enhance awareness of insulin efficacy and the role of insulin therapy in type 2 diabetes given the nature of progressive β-cell failure. These findings also suggest that providers seeking to facilitate the initiation of insulin therapy should avoid using insulin as a threat in an effort to encourage more active self-care and identify and address the specific beliefs that support an individual patient's resistance to insulin therapy.

Acknowledgments— The DAWN study was initiated and funded by Novo Nordisk, which we thank for providing access to the data presented in this report. The preparation of this report was supported by a grant from Novo Nordisk.

Aggregate country-specific data may be made available for local quality-of-care improvement activities (available from www.dawnstudy.com).

APPENDIX

The International DAWN Advisory Panel members are Ib. Brorly, Denmark; Ruth Colagiuri, Australia; P.H.L.M. Geelhoed-Duijvestijn, The Netherlands; Hitoshi Ishii, Japan; Line Kleinebreil, France; R.L., Germany; T.L., Denmark; D.M., U.K.; A. Ramachandran, India; R.R.R., U.S.; F.J.S., The Netherlands; and Giacomo Vespasiani, Italy.

References

1. UK Prospective Diabetes Study (UKPDS) Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352:837–853, 1998
2. De Witt DE, Hirsch IB: Outpatient insulin therapy in type 1 and type 2 diabetes mellitus: a scientific review. *JAMA* 289:2254–2264, 2003
3. Home PD, Boulton AJM, Jimenez J, Landgraf R, Osterbrink B, Christiansen JS: Issues relating to the early or earlier use of insulin in type 2 diabetes. *Practical Diabetes Int* 20:63–71, 2003
4. Brown JB, Nichols GA, Perry A: The burden of treatment failure in type 2 diabetes. *Diabetes Care* 27:1535–1540, 2004
5. Dailey GE: Early insulin: an important therapeutic strategy. *Diabetes Care* 28: 220–221, 2005
6. Davidson MB: Early insulin therapy for type 2 diabetes. *Diabetes Care* 28:222–224, 2005
7. Leslie CA, Satin-Rapaport W, Matheson D, Stone R, Enfield G: Psychological insulin resistance: a missed diagnosis? *Diabetes Spectrum* 7:52–57, 1994
8. Leslie CA, Satin-Rapaport W: Psychological insulin resistance: a challenge for diabetes patients and health care professionals. *J of New Developments Clin Med* 13:21–27, 1995
9. Rubin R, Peyrot M: Psychological issues and treatments in people with diabetes. *J Clin Psychol* 57:457–478, 2001
10. Korytkowski M: When oral agents fail: practical barriers to starting insulin. *Int J Obes* 26 (Suppl. 3):S18–S24, 2002
11. Koerbel G, Korytkowski M: Insulin-therapy resistance: another form of insulin resistance in type 2 diabetes. *Practical Diabetology* 22:36–40, 2003
12. Peyrot M: Psychological insulin resistance: overcoming barriers to insulin therapy. *Practical Diabetology* 23:6–12, 2004
13. Funnell MM, Kruger DF, Spencer M: Self-management support for insulin therapy in type 2 diabetes. *Diabetes Educ* 30:274–280, 2004
14. Polonsky WH, Jackson RA: What's so tough about taking insulin? Addressing the problem of psychological insulin resistance in type 2 diabetes. *Clinical Diabetes* 22:147–150, 2004
15. Ratzman KP: [The psychological aspects of diabetics with the secondary failure of sulfonylurea therapy] (Article in German). *Dtsch Med Wochenschr* 116:87–90, 1991

16. Hunt LM, Valenzuela MA, Pugh JA: NIDDM patients' fears and hopes about insulin therapy: the basis of patient reluctance. *Diabetes Care* 20:292–298, 1997
17. Lauritzen T, Scott A: Barriers to insulin therapy in type 2 diabetes: a qualitative focus group research among patients, GPs and diabetologists. *UEMO Clinical Journal* 1:36–20, 2001
18. Wolfennbuttel BHR, Drossaert CHC, Visser AP: Determinants of injecting insulin in elderly patients with type 2 diabetes mellitus. *Patient Educ Couns* 22:117–125, 1993
19. Zambanini A, Newson RB, Feher M: Injection related anxiety in insulin-treated diabetes. *Diabetes Res Clin Pract* 46:239–246, 1999
20. Mollema ED, Snoek FJ, Pouwer F, Heine RJ, Van Der Ploeg HM: Diabetes fear of injecting and self-testing questionnaire. *Diabetes Care* 23:765–769, 2000
21. Bashoff EC, Beaser RS: Insulin therapy and the reluctant patient: overcoming obstacles to success. *Postgrad Med* 97:86–96, 1995
22. Bogătean Pop Mirela, Hâncu N: People with type 2 diabetes facing the reality of starting insulin therapy: factors involved in psychological insulin resistance. *Practical Diabetes Int* 21:247–252, 2004
23. Okazaki K, Goto M, Yamamoto T, Tsujii S, Ishii H: Barriers and facilitators in relation to starting insulin therapy in type 2 diabetes (Abstract). *Diabetes* 48 (Suppl. 1):A319, 1999
24. Bogătean Pop Mirela, Miclea S, Hâncu N: Patient-provider relationship: a therapeutic tool in overcoming psychological insulin resistance (Abstract). *Diabetalogia* 47: A335, 2004
25. Skovlund SE, Van Der Ven N, Pouwer F, Snoek FJ: Appraisal of insulin therapy among type 2 diabetes patients with and without previous experience of insulin therapy (Abstract). *Diabetalogia* 46:A89, 2003
26. Fremantle N, Blonde L, Duhot D, Hompesch M, Eggersten R, Hobbs FDR, Martinez L, Ross S, Bolinder B, Dtridde E: Availability of inhaled insulin promotes greater perceived acceptance of insulin therapy in patients with type 2 diabetes. *Diabetes Care* 28:427–428
27. Segal R, Helper CD: Drug choice as a problem-solving process. *Med Care* 23: 967–976, 1985
28. Larme AC, Pugh JA: Attitudes of primary care providers toward diabetes: barriers to guideline implementation. *Diabetes Care* 21:1391–1396, 1998
29. Larue F, Colleau SM, Fontaine A, Brasseur L: Oncologists and primary care physicians' attitudes toward pain control and morphine prescribing in France. *Cancer* 76:2375–2382, 1995
30. Isacsson G, Bergman U, Wasserman D, Redfors I, Sjoqvist F: The use of antidepressants and therapeutic drug monitoring by general practitioners and psychiatrists: findings from a questionnaire survey in two Swedish areas. *Annals of Clin Psychiatr* 8:153–160, 1996
31. Cormack MA, Howells E: Factors linked to the prescribing of benzodiazepines by general practice principals and trainees. *Fam Pract* 9:466–471, 1992
32. Virji A, Britten N: A study of the relationship between patients' attitudes and doctors' prescribing. *Fam Pract* 8:314–319, 1991
33. Hadsall RS, Freeman RA, Norwood GJ: Factors related to the prescribing of selected psychotropic drugs by primary care physicians. *Soc Sci Med* 16:1747–1756, 1982
34. Glickman L, Bruce EA, Caro FG, Avorn J: Physicians' knowledge of drug costs for the elderly. *J Am Geriatrics Soc* 42:992–996, 1994
35. Buchsbaum DG, Clancy CM, Centor RM, Buchanan RG: House officer attitudes, beliefs, and recording behavior associated with prescribing minor tranquilizers. *Teaching Learning Med* 2:30–33, 1990
36. Turk DC, Okifugi A: What factors affect physicians' decisions to prescribe opioids for chronic noncancer pain patients? *Clin J Pain* 13:330–336, 1997
37. Paredes P, De la Pena M, Flores-Guerra E, Diaz J, Trostle J: Factors influencing physicians' prescribing behavior in the treatment of childhood diarrhoea: knowledge may not be the clue. *Soc Sci Med* 42:1141–1153, 1996
38. Peyrot M, Rubin R, Lauritzen T, Snoek F, Matthews D, Skovlund S: Psychosocial problems and barriers to improved diabetes management: results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) study. *Diabet Med*. In press
39. Alberti G: The DAWN (Diabetes Attitudes, Wishes and Needs) study. *Practical Diabetes Int* 19:22–24, 2002
40. Davis DA, Thomson MA, Oxman AD, Haynes RB: Changing physician performance: a systematic review of the effect of continuing medical education strategies. *JAMA* 274:700–705, 1995
41. Nyman MA, Murphy ME, Schryver PG, Naessens JM, Smith SA: Improving performance in diabetes care: a multi-component intervention. *Eff Clin Pract* 3:205–212, 2000
42. Push MJV, Anderson J, Pogach LM, Berlowitz DR: Differential adoption of pharmacotherapy recommendations for type 2 diabetes by generalists and specialists. *Med Care Res Rev* 60:178–200, 2003
43. Peyrot M, Matthews D, Snoek F, Colagiuri R, Kleinebreil L, Rubin R, Ishi H, Lauritzen T, Geelhoed-Duijvestijn P, Skovlund S: An international study of psychological resistance to insulin use among persons with diabetes (Abstract). *Diabetologia* 46: A89, 2003