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Original Research Article.

Primary Care Physician Beliefs about Insulin Initiation in Patients with Type 2 Diabetes in Primary Health Care Centres of the Ministry of Health, Jeddah City, Saudi Arabia

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ABSTRACT

Background: Up to 60% of Type 2 diabetic patients will require insulin within 6 to 10 years of initial diagnosis and even sooner if they have had long-standing undetected disease. Primary care physicians are more likely to manage T2DM than are specialists, and they are increasingly responsible for the initiation and management of insulin therapy in patients.

Objectives: To assess the beliefs of primary care physicians about initiation of insulin in patients with type 2 diabetes in the PHC centres of the ministry of health in Jeddah city, Saudi Arabia.

Subjects and Methods: A cross sectional study was conducted included all the primary health care physicians working during the study period in the PHC centres of the ministry of health in Jeddah city, Saudi Arabia. Self-administered questionnaire that has been validated in previous published study has been utilized for data collection. It consists of main two parts; the first part includes questions about the personal and professional characteristics of the physicians and the second part includes 30 belief items. Respondents were asked to indicate on a five-point Likert-type scale ranging from one, 'strongly disagree', to five, 'strongly agree'.

Results: The study included 101 PHC physicians out of 124 invited to participate in the study, giving a response rate of 81.5%. Their age ranged between 24 and 58 years with a mean of 33.4±7 years. Females represent almost two-thirds of the participants (64.4%). For 6 belief items, ≥ 66% of PHCPs agreed with the statement, indicating shared beliefs about the importance of education to insulin initiation, the barrier that injection poses to patients' acceptance of insulin, patient fears prior to starting insulin, the benefit to patients of receiving insulin prior to the development of complications, patients once they are on insulin, the reluctance of patients on oral therapy to accept an insulin prescription and the initiation of insulin as one of the most difficult aspects of managing patients with type 2 diabetes. Physicians` age and level of training were the most significant factors associated with their belief regarding initiating insulin therapy in T2DM.

Conclusion: Most of PHCPs in Jeddah, KSA believe that insulin therapy provides many benefits to patients with T2DM with significant improvements in glycaemia control and reduction in long-term complications of diabetes. However, some PHCPs have beliefs about insulin that are barriers to attaining this goal.

Keywords: T2DM, Insulin, Primary Health Care, Beliefs.

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INTRODUCTION

The prevalence of type 2 diabetes mellitus (T2DM) worldwide has reached epidemic proportions. Patients with type 2 diabetes are frequently maintained in poor glycaemic control for prolonged periods, increasing the risk of serious complications.[1]

The American Diabetes Association (ADA) recommends a target glycosylated haemoglobin (HbA_{1c}) level of 7% or less to achieve glycaemic control in most patients with T2DM.[2] The importance of effective glycaemia control in patients with diabetes mellitus is well established. In the seminal United Kingdom Prospective Diabetes Study (UKPDS), which helped determine current targets for HbA_{1c}, lowering glycaemia levels reduced the incidence of long-term microvascular and neuropathic complications.[3]

Due to the progressive nature of T2DM, β-cell function and physiologic insulin response continue to deteriorate over time, even in the presence of good glycaemic management. Therefore, despite escalating regimens of oral medications, many patients eventually require insulin therapy to achieve adequate glycaemic control.[4]

Up to 60% of patients will require insulin within 6 to 10 years of initial diagnosis and even sooner if they have had long-standing

undetected disease.[5] The role of primary care physicians in managing T2DM continues to expand. Primary care physicians are more likely to manage T2DM than are specialists, and they are increasingly responsible for the initiation and management of insulin therapy in patients.[5]

Primary care physicians' confidence in introducing treatment with insulin can be instrumental in improving the long-term health of their patients. Research shows that nearly all primary care physicians are aware of appropriate goals for glycaemia control in patients with T2DM.[6] Nevertheless, many of these physicians tend to adopt treatment approaches that are inconsistent or at least inadequate, to achieve glycemic targets. Notable among these approaches is resistance to initiate insulin.[7]

The Diabetes Attitudes, Wishes, and Needs (DAWN) study found that many US physicians, especially those in primary care, are inclined to delay initiation of insulin therapy. In fact, US physicians ranked lowest among physicians in all nations except Japan and India in their disposition to initiate insulin.[7]

Evidence suggests that, in a typical US primary care practice, insulin initiation is not triggered until a patient's HbA_{1c} level has reached 9% or greater.[8] Physician resistance to prescribing insulin may originate from either physiologic or practical concerns. Physiologic concerns include apprehension about hypoglycaemia or weight gain and the belief that insulin causes adverse metabolic effects. Examples of practical concerns about insulin initiation include patient anxiety, complexity in training patients, and demands on the physician or the physician's practice to manage the patient's use of insulin.[9] With regard to practical concerns; initiation of insulin will likely impose additional time demands on the physician or practice. However, many physicians report that these additional demands are not excessive and can be addressed with small steps in patient education.[6] Although some patients initially experience anxiety about insulin, this attitude often reverses after they begin using insulin. Many patients report less fatigue and an improved sense of well-being, as well as high levels of treatment satisfaction, after beginning insulin therapy. Thus, early education of patients about the benefits of insulin can reduce burdens on the physician and practice.[10]

This study aimed to assess the beliefs of primary care physicians about initiation of insulin in patients with type 2 diabetes in the PHC centres of the ministry of health in Jeddah city, Saudi Arabia.

SUBJECTS AND METHODS

A cross-sectional study was carried out in the ministry of health primary health care centres in Jeddah city which are 38 centres at the time of the study distributed geographically into 4 sectors with 145 physicians. Jeddah is the second largest city in Saudi Arabia. It is the main port of the Kingdom on the Red Sea and main gate through which most of the pilgrims arrive by air and sea to perform Umrah, Hajj or to visit the two holy mosques. Area inhabited is more than 1,500 km^2, and population is more than 3.4 million. In Jeddah there are around 12 governmental hospitals, 38 primary health care centres, more than 30 private hospitals and 128 polyclinics.

Primary health care physicians working in the PHC centres of the ministry of health in Jeddah city, at the period of the study constituted the target population. Twenty-one physicians were out of the work either internal or external. Thus, the total number of physicians invited to participate in the study was 124.

Self-administered questionnaire that has been validated in previous published study was used for data collection. [(6)] The questionnaire consists of main two parts; the first part includes questions about the personal and professional characteristics of the physicians (age, sex, Postgraduate medical degrees, years of experience in primary care and average number of patients with type 2 diabetes seen per week). The second part includes 30 belief items beginning with 'I believ'. For the belief items, respondents were asked to indicate on a five-point Likert-type scale ranging from one, 'strongly disagree', to five, 'strongly agree'.

Joint program of family and community medicine permission to conduct the research was obtained as well as individual consents were written in the questionnaire forms.

Data were entered and analysed by SPSS version 19. Continuous variables were presented as mean, range and standard deviation (SD) while categorical variables were presented as frequency and percentage. Frequency distributions were calculated for all survey items. To determine beliefs about which PHCPs lacked consensus, the 'strongly agree' responses were combined with the 'agree' responses and the 'strongly disagree' responses were combined with the 'disagree' responses. Items with 50% or more of responses falling into either the 'agree' or the 'disagree' category were considered beliefs about which there was consensus. Items for which neither the 'agree' nor the 'disagree' category contained 50% or more of the responses were considered beliefs about which there was no consensus and which may represent areas of confusion.

To identify associations between selected PHCPs characteristics and item responses, a one-way analysis of variance (ANOVA) was performed for each of the 30 items using the item as a dependent variable and PHCPs characteristics as independent variables in case of more than two groups. Least significant difference (LSD) post hoc tests were used to determine significant differences between independent variable groups. Student`s t-test was used in case of comparison between two groups. Significance was determined at p value < 0.05.

RESULTS

The study included 101 PHC physicians out of 124 invited to participate in the study, giving a response rate of 81.5%.

Table (1) presents the personal characteristics of the participated PHC physicians. Their age ranged between 24 and 58 years with a mean of 33.4 years and standard deviation of 7 years. Females represent almost two-thirds of the participants (64.4%). Most of them were general practitioners (74.3%). In more than half of them (54.5%), years of experience were 5 years or less. Number of patients with type 2 diabetes seen in an average week was ranged between 10 and 25 among 58.4% of the physicians.

Table 2 presents the response distributions of belief items for which > 50% of responses fell into the 'agree' or 'disagree' category. For 6 items, ≥ 66% of PHCPs agreed with the statement, indicating shared beliefs about the importance of education to insulin initiation (item 2), the barrier that injection poses to patients' acceptance of insulin (item 3), patient fears prior to starting insulin (item 6), the benefit to patients of receiving insulin prior to the development of complications (item 8), patients once they are on insulin, the reluctance of patients on oral therapy to accept an insulin prescription (item 9) and the initiation of

insulin as one of the most difficult aspects of managing patients with type 2 diabetes (item 10).

At least 50% of PHCPs agreed that patients would be willing to initiate insulin therapy if was not administered by injection (item 1), the benefits of insulin outweighing risks of hypoglycaemia (item 4), primary care physicians might prescribe insulin more frequently if the route of administration did not involve injections (item 5), most of their patients using insulin feel much better physically once they become accustomed to using insulin therapy (item 7), the risk of hypoglycaemia from insulin therapy makes them reluctant to prescribe it for most of my patients ≥ 85 years of age (item 12), most patients would not need to go on insulin if they would follow their physicians' recommendations (item 13) and most of their patients using insulin are satisfied with their diabetes therapy (item 14).

More than half of PHCPs (53.5%) disagreed that the risk of weight gain made them reluctant to prescribe insulin to patients with body mass index (BMI) ≥ 35 (item 11).

Table 1: Personal characteristics of the participants (n=101).

Characteristics		No.	%
Age in years	**≤30**	43	42.6
	31-40	44	43.6
	>40	14	13.9
Range (years)		24-58	
Mean±SD (years)		33.4±7.0	
Gender	**Male**	36	35.6
	Female	65	64.4
Level of training	**General practitioner**	75	74.3
	Family physician	26	25.7
Years of practice	**≤5**	55	54.5
	6-10	27	26.7
	>10	19	18.8
Number of patients with type 2 diabetes seen in an average week	**10-25**	59	58.4
	>25	42	41.6

Table 2: Frequency distribution for items in which 50% or more primary care physicians (n=101) agreed or disagreed with the belief statements.

ITEMS	STATEMENTS	Response		
		Disagree to strongly disagree No. (%)	Neutral No. (%)	Agree to strongly agree No. (%)
1	I believe more of my patients would be willing to initiate insulin therapy if it were not administered by injection.	20 (19.8)	20 (19.8)	61 (60.4)
2	I believe for most of my patients, education is the key to the initiation of insulin.	10 (9.9)	10 (9.9)	81 (80.2)
3	I believe for most of my patients, the injection route of administration is the greatest barrier to their acceptance of insulin therapy.	7 (6.9)	19 (18.8)	75 (74.3)
4	I believe for most of my patients, the benefits of insulin therapy outweigh the risks of hypoglycaemia.	19 (18.8)	25 (24.8)	57 (56.4)
5	I believe primary care physicians might prescribe insulin more frequently if the route of administration did not involve injections.	26 (25.7)	21 (20.8)	54 (53.5)
6	I believe most of my patients on oral diabetes therapy are afraid of insulin therapy.	5 (5.0)	11 (10.9)	85 (84.2)
7	I believe most of my patients using insulin feel much better physically once they become accustomed to using insulin therapy.	9 (8.9)	27 (*26.7)	65 (64.4)
8	I believe most patients would benefit from receiving insulin therapy prior to the development of diabetes complications.	13 (12.9)	20 (19.8)	68 (67.3)
9	I believe most of my patients on oral diabetes therapy would be reluctant to accept a prescription for insulin.	16 (15.8)	19 (18.8)	66 (65.3)
10	I believe the initiation of insulin is one of the most difficult aspects of managing my patients with type 2 diabetes.	19 (18.8)	8 (7.9)	74 (73.3)
11	I believe the risk of weight gain associated with insulin therapy makes me reluctant to prescribe it for most of my patients with BMI ≥35.	54 (53.5)	23 (22.8)	24 (23.8)
12	I believe the risk of hypoglycaemia from insulin therapy makes me reluctant to prescribe it for most of my patients ≥ 85 years of age.	21 (20.8)	22 (21.8)	58 (57.4)
13	I believe most patients would not need to go on insulin if they would follow their physicians' recommendations.	19 (18.8)	20 (19.8)	62 (61.4)
14	I believe most of my patients using insulin are satisfied with their diabetes therapy.	26 (25.7)	22 (21.8)	53 (52.5)

Table 3: Frequency distribution for items in which < 50% of primary care physicians (n=101) agreed or disagreed with the belief statements.

ITEMS	STATEMENTS	Response		
		Disagree to strongly disagree No. (%)	Neutral No. (%)	Agree to strongly agree No. (%)
1.	I believe for most of my patients, the benefits of insulin therapy outweigh the risks of weight gain.	22 (21.8)	35 (34.7)	44 (43.6)
2.	I believe most of my patients using insulin are able to manage the demands of insulin therapy.	28 (27.7)	34 (33.7)	39 (38.6)
3.	I believe most of my patients find the demands of insulin therapy to be less than they expected.	20 (19.8)	37 (36.6)	44 (43.6)
4.	I believe most of my patients using insulin take their insulin as prescribed (i.e. are adherent).	22 (21.8)	29 (28.7)	50 (49.5)
5.	I believe most of my patients on oral diabetes therapy would regard the initiation of insulin as a personal failure	39 (38.6)	25 (24.8)	37 (36.6)
6.	I believe most of my patients using insulin are satisfied with their diabetes therapy.	27 (26.7)	31 (30.7)	43 (42.6)
7.	I believe training in the proper administration and usage of insulin is too complicated for most patients.	43 (42.6)	25 (24.8)	33 (32.7)
8.	I believe the follow-up needed for most of my patients on insulin is too resource-intensive for my staff.	39 (38.6)	30 (29.7)	32 (31.7)
9.	I believe for most of my patients, the fear of side effects (hypoglycaemia and / or weight gain) is the greatest barrier to their acceptance of insulin therapy.	41 (40.6)	19 (18.8)	41 (40.6)
10.	I believe most of my patients using insulin self-monitor their blood glucose with sufficient frequency.	35 (34.7)	25 (24.8)	41 (40.6)
11.	I believe training most of my patients in the proper administration and usage of insulin is too time-consuming for my staff.	46 (45.5)	31 (30.7)	24 (23.8)
12.	I believe most patients will eventually need to go on insulin regardless of how well they adhere to their treatment regimen.	39 (38.6)	33 (32.7)	29 (28.7)
13.	I believe increased levels of plasma insulin will increase the risk of a cardiovascular event.	42 (41.6)	32 (31.7)	27 (26.7)
14.	I believe increasing insulin levels in obese patients will cause more insulin resistance.	29 (28.7)	28 (27.7)	44 (43.6)
15.	I believe most patients do not need a prescription of insulin until they have a beta cell inadequacy.	42 (41.6)	25 (24.8)	34 (33.7)
16.	I believe most of my patients on oral diabetes therapy would be less adherent with insulin therapy.	22 (21.8)	31 (30.7)	48 (47.5)

Table 4: Belief items with significant one-way analysis of variance procedures and at least one significant post hoc test by age of PHCPs.

ITEMS	STATEMENTS	Age Mean score (SD)			p-value
		≤30 n=43	31-40 n=44	>40 n=14	
1.	I believe for most of my patients, education is the key to the initiation of insulin.	4.4* (0.7)	3.9 (1.3)	4.3 (1.1)	0.045
2.	I believe training in the proper administration and usage of insulin is too complicated for most patients.	3.4 (0.8))	3.1 (0.9)	3.7† (0.9)	0.047
3.	I believe increased levels of plasma insulin will increase the risk of a cardiovascular event.	2.9 (1.1)	2.6 (0.9)	3.4† (1.0)	0.022
4.	I believe most of my patients using insulin are satisfied with their diabetes therapy.	3.4 (1.0)	3.1 (0.9)	3.7† (0.8)	0.043

* ≤30 years are significantly different from 31-40 years. † >40 years are significantly different from 31-40 years.

Table 3 presents response distributions for the belief items in which < 50% of responses fell into the 'agree' or 'disagree' category. Slightly less than half of PHCPs (49.5%) agreed that most of their patients using insulin take their insulin as prescribed (item 4) and those on oral diabetes therapy would be less adherent with insulin therapy (47.5%, item 16). Forty-four percent of PCPs agreed that for most of their patients, the benefits of insulin therapy outweigh the risks of weight gain (item 1), most of their patients find the demands of insulin therapy to be less than they expected (item 3) and increasing insulin levels in obese patients will cause more insulin resistance (item 14). More than 40% of PHCPs disagreed that training in the proper administration

and usage of insulin is too complicated for most patients (item 7), training most of their patients in the proper administration and usage of insulin is too time-consuming for their staff (item 11) and increased levels of plasma insulin will increase the risk of a cardiovascular event (item 13). Response distributions for items 5 and 9 show bimodal distributions (< 25% of the responses were 'neutral', and remaining responses were nearly equally divided between 'agree' and 'disagree'). The results indicate that PHCPs lack consensus that: most patients using insulin are able to manage the demands of insulin therapy (item 2), using insulin are satisfied with their diabetes therapy (item 6), most of their patients using insulin self-monitor their blood glucose with sufficient frequency (item 10) and most patients do not need a prescription of insulin until they have a beta cell inadequacy (item 15). Item response distributions for items 8 and 12 in Table 3 shows unimodal distributions (responses are distributed approximately equally between 'agree', 'neutral' and 'disagree'), suggesting that there is confusion among PCPs about the metabolic effect of insulin.

ASSOCIATION BETWEEN BELIEFS AND PHCPS PERSONAL CHARACTERISTICS

Age

In the one-way ANOVA procedures, significant differences between beliefs of PHCPs of different age categories were observed in 4 items as shown in table (4). Younger PHCPs (≤30 years) showed more strongly belief than those in the age group of 31-40 years that for most of patients, education is the key to the initiation of insulin. On the other hand, older PHCPs (>40 years) more strongly agreed than those aged between 31 and 40 years that for most of patients, training in the proper administration and usage of insulin is too complicated for most patients, increased levels of plasma insulin will increase the risk of a cardiovascular event and most of patients using insulin are satisfied with their diabetes therapy.

Gender

Two significant differences in beliefs by gender were identified: Women agreed significantly (p =0.048) more strongly than men (3.9 vs. 3.5) that the initiation of insulin is one of the most difficult aspects of managing my patients with type 2 diabetes. Men agreed significantly (p =0.002) more strongly than women (3.1 vs. 2.4) that the risk of weight gain associated with insulin therapy makes me reluctant to prescribe it for most of my patients with BMI ≥35.

Years of Practice

Table 6 shows that two significant differences in beliefs by years of practice were identified using the one-way ANOVA procedures. These beliefs were training in the proper administration and usage of insulin is too complicated for most patients and the follow-up needed for most of patients on insulin is too resource-intensive for staff. Post hoc analyses showed significant differences between categories of years of practice for aforementioned belief items. PHCPs with ≤ 5 years' experience agreed more strongly than those with >5-10 years' experience that training in the proper administration and usage of insulin is too complicated for most patients. In addition, the more experienced group (>10 years) agreed more strongly than the less experienced group (>5-10 years) that the follow-up needed for most of their patients on insulin is too resource-intensive for their staff.

Table 5: Belief items with significant Student`s t-test procedures by gender of PHCPs.

ITEMS	STATEMENTS	Gender Mean score (SD)		p-value
		Males n=36	Females n=65	
1.	I believe the initiation of insulin is one of the most difficult aspects of managing my patients with type 2 diabetes.	3.5 (1.2)	3.9 (1.0)	0.048
2.	I believe the risk of weight gain associated with insulin therapy makes me reluctant to prescribe it for most of my patients with BMI ≥35.	3.1 (1.0)	2.4 (0.9)	0.002

Table 6: Belief items with significant one-way analysis of variance procedures and at least one significant post hoc test by years of practice of PHCPs.

ITEMS	STATEMENTS	Years of practice [Mean score (SD)]			p-value
		≤5 n=55	>5-10 n=27	>10 n=19	
1.	I believe training in the proper administration and usage of insulin is too complicated for most patients.	3.1* (1.0)	2.6 (0.9)	3.0 (0.8)	0.046
2.	I believe the follow-up needed for most of my patients on insulin is too resource-intensive for my staff.	3.0 (0.8))	2.6 (1.0)	3.2† (0.9)	0.050

* ≤5 years are significantly different from >5-100 years. † >10 years are significantly different from >5-10 years.

Level of Training

Student`s t-test showed significant differences between general practitioners and family physicians for five belief items (Table 7). In general, family physicians agreed more strongly and significantly than general practitioners that more of patients would be willing to initiate insulin therapy if it were not administered by injection (p=0.008), for most of patients, the benefits of insulin therapy outweigh the risks of hypoglycaemia (p<0.001) and weight gain (p=0.006), most patients would benefit from receiving insulin therapy prior to the development of diabetes complications (0.031) and most of patients on oral diabetes therapy would be reluctant to accept a prescription for insulin (p=0.016).

Average No. of Patients with Type 2 Diabetes Seen Per Week

Table (8) shows that the mean score of PHCPs who saw > 25 such patients per week was significantly higher than that of PHCPs who saw fewer such patients. PHCPs seeing > 25 such patients agreed more strongly that for most of patients, the benefits of insulin therapy outweigh the risks of hypoglycaemia (3.7 versus 3.3) and most of patients on oral diabetes therapy would be less adherent with insulin therapy (3.5 versus 3.1).

Table 7: Belief items with significant Student`s t-test procedures by level of training of PHCPs.

ITEMS	STATEMENTS	Level of training Mean score (SD)		p-value
		General practitioner n=75	Family physician n=26	
1.	I believe more of my patients would be willing to initiate insulin therapy if it were not administered by injection.	3.4 (1.2)	4.08 (0.9)	0.008
2.	I believe for most of my patients, the benefits of insulin therapy outweigh the risks of hypoglycaemia.	3.3 (0.9)	4.0 (0.8)	<0.001
3.	I believe for most of my patients, the benefits of insulin therapy outweigh the risks of weight gain.	3.1 (0.9)	3.7 (0.8)	0.006
4.	I believe most patients would benefit from receiving insulin therapy prior to the development of diabetes complications.	3.6 (0.9)	4.1 (0.9)	0.031
5.	I believe most of my patients on oral diabetes therapy would be reluctant to accept a prescription for insulin.	3.5 (1.0)	4 (0.8)	0.016

Table 8: Belief items with significant Student`s t-test procedures by number of patients with type 2 diabetes seen by PHCPs in an average week.

ITEMS	STATEMENTS	Number of patients Mean score (SD)		p-value
		10-25 n=59	>25 n=42	
1.	I believe for most of my patients, the benefits of insulin therapy outweigh the risks of hypoglycaemia.	3.3 (0.9)	3.7 (1.0)	0.049
2.	I believe most of my patients on oral diabetes therapy would be less adherent with insulin therapy.	3.1 (0.9)	3.5 (0.9)	0.048

DISCUSSION

Primary health care physicians play an essential role in the management of T2DM since they often initiate insulin therapy and intensify regimens over time as needed.[11]

This study indicates that while PHCPs share some beliefs about initiating insulin, there is a lack of consensus about other aspects of insulin therapy. Most shared beliefs fall into one of five categories: positive experiences of patients on insulin, benefits of insulin therapy vs. Risks, fears or concerns of patients still on oral therapy, concerns about injection route of insulin therapy and the management of and training for insulin use.

In the current work, almost half of PHCPs agreed that the benefits of using insulin to prevent or delay complications outweighed the risk of hypoglycaemia with special concern for elderly patients. For example, while 56.4% of PHCPs agreed that the benefits of insulin outweighed the risks of hypoglycaemia for most patients, 57.4% agreed that the risk of hypoglycaemia made them reluctant to prescribe insulin to most patients who were ≥ 85 years old. The risk of hypoglycaemia is greater in elderly patients who have poor or erratic nutritional intake, and⁄or comorbidities12 and impaired recovery from hypoglycaemia.13,14 However, there were fewer consensuses regarding the risk of weight gain in extremely obese patients.

Half of PHCPs compared to most of those in a study conducted by Hayes et al6 agreed that patients on insulin were satisfied with their insulin therapy. Studies show that patients on insulin, regardless of delivery mode (vial and syringe, pen or inhalation), have high levels of treatment satisfaction.15-17 On the other hand, the majority of PHCPs in the present research agreed that patients on oral diabetes therapy are afraid of insulin therapy which could explain the low satisfaction.

Most of PHCPs in the present study agreed that for most patients, education is the key to insulin initiation. However, Brunton et al.[18] pointed out that this education is usually given when diabetes has progressed to the point that insulin is the only alternative for glucose control. They further stressed the importance of educating the patient at diagnosis about the disease progression of diabetes and the inevitability of needing insulin to maintain good glycaemic control, rather than using insulin as a threat to motivate patients. Although Riddle[19] identified the complexity of training patients in the proper use of insulin as a contributing factor to its under-use, 42.6% of the PHCPs disagreed that training was too complicated for patients and 38.6% disagreed that follow-up was too resource-intensive for their staff. However, there was no consensus that the time needed for training in the proper administration and usage of insulin was too much for their staff. This is not surprising as educational resources available to PCPs for insulin initiation vary widely. Primary care physicians also clearly lacked consensus on whether patients on insulin performed self-monitoring of blood glucose (SMBG) sufficiently for appropriate insulin use. Appropriate SMBG frequency varies according to insulin regimen: three or four times daily is recommended for multiple injections, less frequent monitoring is needed for less intensive therapy.[20] However, SMBG in patients with type 2 diabetes is often suboptimal.[21] Reimbursement and resources for SMBG instruction may be highly variable, and SMBG adds to the patient's 'hassle factor'. These issues may contribute to lack of PCP consensus about patient SMBG sufficiency, but patient fear of SMBG probably does not influence this PCP belief.[22]

When associations between PHCP characteristics and beliefs were examined, very little difference was seen in beliefs by

gender, number of patients seen or years of experience. However, PCP attitudes varied by both age and level of training. Family physicians as well as older physicians had more positive attitudes about patients on insulin than general practitioners and physicians of middle age (31-40 years), perhaps simply because of more long term experience with such patients and training during family Medicine courses. General practitioners are unlikely to facilitate insulin initiation without some in-practice support systems.[23]

PHCPs with the moderate practice experience disagreed more strongly than more experienced PCPs that follow-up needed for most patients on insulin is too resource-intensive for staff. The beliefs of the moderate experienced may reflect the fact that the 'compelling evidence' mentioned by Riddle[19] has been incorporated into medical student and resident education. Primary care physicians who treated greater numbers of patients with type 2 diabetes per week appeared to be more risk-averse concerning insulin initiation compared with those who saw fewer patients, indicating that the diabetes care of many patients with type 2 diabetes is being managed by PCPs who have beliefs that suggest a reluctance to initiate insulin therapy in such patients.

Most PCPs agreed that patients on oral therapy are afraid of insulin injections and that this fear is a barrier to initiating insulin. PCPs were also largely in agreement that patients on oral therapy would be reluctant to initiate insulin and would have feelings of personal failure. These general patient concerns are well documented in the literature.[6,24-26]

Most PCPs agreed that patients feel much better after they have begun insulin and that patients can manage the demands of insulin. Several studies have confirmed that patients, including elderly patients, experience reduction in fatigue and increased feelings of well-being when they begin insulin and that these improvements are sustained over time.[27-30]

A limitation of this study is that the data were self-reported and may differ from actual practice patterns of the study participants. However, other work has shown that physician attitudes are closely linked to behaviour,[6,31] leading us to assume that many PHCPs delay the prescribing of insulin to patients with type 2 diabetes. Another limitation is that, almost two-thirds of participated PHCP were females. Therefore, the attitudes of male PHCPs may not have been sufficiently represented. Finally, another limitation is the survey administration: This study is generalisable to only those PHCPs in Jeddah and who would volunteer for such a study.

In conclusion, most of primary Health care physicians in Jeddah, KSA believe that insulin therapy provides many benefits to patients with T2DM with significant improvements in glycaemia control and reduction in long-term complications of diabetes. However, some PHCPs have beliefs about insulin that are barriers to attaining this goal.

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