Primary care physicians' barriers to initiate insulin in Type 2 diabetes mellitus. A survey from the Eastern Province, Saudi Arabia

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Abstract

Background: The majority of type 2 diabetic patients seek care at the primary care level. With rising prevalence, the primary health care (PHC) physicians will have a greater role which will mandate further involvement in diabetes management, including starting and monitoring insulin.

Objectives: To explore barriers that PHC physicians in the Eastern Province, KSA, face in initiating insulin therapy for type 2 diabetes mellitus.

Methods and Material: A self-administered questionnaire was used among PHC physicians in the Eastern Province (Dammam and Qatif) during January and February 2014. We used a validated tool to assess barriers related to insulin therapy centered on 4 main themes: issues with doctor's experience; explanation burden; concerns about patients' burden and regarding insulin therapy.

Results: A total of 194 primary care physicians were surveyed, with an overall response rate of 84%. The majority of the physicians (80.9 %) were doctors with no postgraduate training, and 19.1% had postgraduate qualifications. Half of the physicians reported that they have no experience with the initiation of insulin. One third of the physicians perceived their current experience as a barrier to the initiation of insulin for their patients. There were significant variations in perceived barriers among trained and untrained doctors.

Conclusions: This study showed that PHC physicians faced many problems in initiating insulin for type 2 diabetic patients. Organizing focused CPD sessions and implementing clear guidelines supported with insulin initiating algorithm will make insulin initiation easier. The PHC system should provide supporting staff such as chronic care nurses, dieticians, diabetic educators and pharmacists to work in a collaborative team with PHC physicians.

Key words: Initiation of insulin, type 2 diabetes, primary health care physicians, and barriers.

Introduction

Diabetes mellitus (DM) is one of the most common non-communicable global diseases (NCDs) (1). The International Diabetes Federation 2010, ranked Saudi Arabia as the country with the third highest prevalence of diabetes (2).

A national survey in 2004 estimated that 23.7 % of Saudi adults had Type 2 Diabetes Mellitus (T2DM), and this percentage increased to 30 % in 2011(3, 4).

Despite the widespread benefits of controlling diabetes, only one third of patients in KSA have optimum glycemic control (5). Though there are many options for controlling diabetes, insulin is the most effective pharmacological option (6).

However, treatment with insulin is very complex in comparison to oral medications (7). Therefore; it requires a knowledgeable, experienced physician and a cooperative patient (7).

In KSA, the majority of patients with diabetes seek medical care at the primary care level(2). Furthermore, the burden on the PHC physicians will be even greater as prevalence rises, compelling them to increase the scope of their involvement in diabetes management to include starting and monitoring insulin. Research indicates that the confidence doctors in primary health care possess to start insulin varies worldwide. The majority of GPs in the UK and Netherlands start and monitor their patients, whereas in Australia, less than 20% of general practitioners start insulin among diabetic patients (8, 9). Similarly, a survey of 28 PHC centers in KSA revealed that approximately 35 % of T2DM patients had been on insulin, either alone or in combination with oral hypoglycemic agents (10).

Different barriers to initiating insulin have been studied in many nations (11). These can be categorized as physician-related, system-related and patient-related factors. The determinants which hinder physicians from starting insulin therapy include: lack of knowledge, lack of diabetes-oriented educational activities, scarcity of evidence-based guideline application, fear of hypoglycemia, non-compliance of patients as well as financial and time constraints (12).

However, there is very little published evidence in KSA on physician- related barriers concerning insulin therapy. Moreover, in order to understand the cultural and contextual care in KSA, it is important to understand the barriers associated with PHC physicians so that targeted interventions can be planned. Consequently, the aim of this study was to explore the obstacles primary care physicians face concerning insulin therapy for patients with type 2 diabetes mellitus in the Eastern Province, KSA.

Methods and Material

The study was a cross-sectional study through self-administered questionnaire targeting all primary care physicians working in the eastern province of Saudi Arabia, Qatif and Dammam cities from January 2014 to February 2014.

Physicians' experience with insulin use in type 2 diabetes mellitus and their barriers to insulin initiation (dependent variables) was compared to their demographic data including age, sex, nationality, and work experience. Certification, place of graduation, number of diabetes related CME activities attended, the number of patients seen daily, the number of diabetic patients seen weekly (independent variables).

The questionnaire was adapted from the PAINT questionnaire of the Japanese DAWN study and was approved by a consultant family physician and a clinical research expert. (see Appendix A).

Reliability of the questionnaire was examined using Cronbach's alpha statistic, and the alpha Coefficient was 0.94, which was considered highly reliable.

A pilot study of 30 PHC physicians was done to assess the reliability of this questionnaire in our community. The internal consistency of the 30 responses collected was found to be good, with Cronbach alpha of 80.9%

After granted the approval of the local research committee, the regional directorate of primary care in the eastern province authenticated the start of our research. The questionnaire were distributed to all primary health care centers in Dammam and Qatif areas, Eastern Province, Saudi Arabia. In order to increase the response rate of the study, SMS messages were sent to PHC physicians prior to the distribution of the questionnaire. Thereafter, the questionnaires were handed to the physicians either personally by the primary investigator or through the department of training and development of the regional primary care administration.

In the 8 weeks of collection, 194 questionnaire out of 230 PHC physicians in both Dammam and Qatif were obtained, giving an 84% response rate.

The Statistical Package of the Social Sciences (SPSS) version 21.0 was used for the statistical analysis.

A score was calculated for the response at each one of the four dimensions of the barrier part of the questionnaire. A score of 60% or higher was considered a barrier in each dimension.

Appropriate statistical analytical techniques were performed. Frequency distribution tables were constructed with the mean and standard deviation. Significant level was set at less than 0.05 throughout the study. Independent t-test, Pearson correlation coefficient and Chi-square ($\chi 2$)

were used to examine the association between each independent variable and each outcome measure.

To our knowledge, this was the first study in the Eastern Province, which focused on the barriers confronting primary care physicians in initiating insulin in type 2 diabetes.

Ethical consideration:
The cover letter of the questionnaire clarified the objectives of the study and the assurance of confidentiality.

Approval was obtained from the local research committee of the Regional Directorate of Primary Care in the Eastern Province before conducting the research. Primary investigators encouraged physicians' participation, but they were assured of their right to refuse to participate. Physicians were given the assurance that the outcome of the research would not be used as a means of appraising their performance. To maintain confidentiality, the physicians were to send their completed questionnaire directly to the principal investigator.

Results

The total number of primary care physicians working in Qatif and Dammam was 230. A total of 194 physicians completed the study questionnaire, yielding an overall response rate of 84%.

The mean age of all respondents was 33±7.7 years, with a minimum age of 24, and a maximum age of 56 years. Of those who indicated their gender, 124(64.9 %) were female while 67 (34.1%) were male. Seventy nine percent of the study participants were Saudis and 20.8% were non-Saudis. (Table 1) A majority of them were graduates from the University of Dammam (UOD).

Table 1: Sociodemographic characteristics of physicians

Table 2: Work Experience and load on physicians		
Work experience in PHC	N	%
0 - 9	151	78.6
10 - 18	27	14.1
19 -27	14	7.3
number of patients /day		
0 -20	43	22.5
21 - 40	93	48.7
41 - 60	43	22.5
61 and more	12	6.3
Number of Diabetic Patients /week		
0 -20	129	69.7
21 - 40	43	23.2
41 - 60	10	5.4
61 and more	3	1.6

The mean duration of work experience as primary care physicians was 5.8±6.3 years.

The majority of the physicians (80.9 %) were general practitioners. The minority included: Saudi board qualified 15 (7.7%), graduates with diplomas 10 (5.5%), and doctors with postgraduate qualifications other than in family medicine were 12, constituting 6.2%. (Table 1)

The majority of physicians (three quarters) had attended at least one diabetes- related CME activity in the past year, while one quarter had not attended any activity.

The mean number of patients encountered per day was 35.54±1.8 patients, with a minimum of one patient/day and maximum of one hundred patients/day. As shown in Table 2, almost one half of the physicians saw 21 to 40 patients daily, whereas, 22.5% had ≤ 20 patients/day. The same percentage of physicians saw 41 to 60 patients daily.

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Of the 194 PHC physicians who participated in this study, 46.9% had started insulin with their diabetic patients, while 53.1% had never given insulin to any diabetic patient. The proportion of physicians who offered insulin to their patients was slightly higher than those who actually started their patients on insulin (56.7% vs 46.9%). Approximately, less than half (43.3) of the participants did not offer their diabetic patients insulin therapy. In respect of qualifications, the findings

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qualifications, the findings revealed that of the PHC physicians who started insulin, the rate of initiating it was noticeably higher among qualified family physicians (100% among family medicine board graduates, and 80% among family medicine diploma graduates). Only 40.8% and 33.3% of GPs and doctors with other qualifications respectively, initiated insulin therapy.

After combining the 'agree' and 'strongly agree' as well as the 'disagree' and 'strongly disagree' responses in one category as shown In Tables 3, 4 and 5, the frequency distribution of each item response is displayed for all PHC physicians, PHC physicians without postgraduate qualifications and PHC physicians with post- graduate qualifications in family medicine.

Around 28% of physicians regarded their current experience with insulin as an obstacle to initiating insulin for their patients. There were significant variations among the doctors with different qualifications (P value 0.002). The largest group was that of GPs (35.2%), followed by doctors with other qualifications (9.1%). Family medicine certified doctors, (0.00%) both those with a diploma and board graduates did not perceive this as a barrier. The biggest obstacle, which held the physicians back from using insulin, was their disquiet about insulin therapy (the issues of patient rejection and decreased compliance, insulin use in the elderly, need for hospitalization and the risk of hypoglycemia). The majority of physicians considered this an obstacle (80%).

Despite the total agreement of doctors on the previously mentioned concerns, significant variations among the doctors with different qualifications were also noticed (P value 0.007). GPs constituted 84.5% as compared to 61.5% and 70% among board and diploma certified respectively.

More than one third of the physicians (36.6%) considered burden of patients as a barrier to use insulin. There were no significant differences with regard to the different qualifications held by the doctors, P value 0.256. Board certified formed the smallest group that considered this a burden (13.3%), while doctors with other qualifications were the most concerned about patients. The weight of this burden among GPs and diploma certified was 38% and 40% respectively. Furthermore, almost half of the doctors also considered the pain and cost as the barriers to use of insulin (46.9%). However, the difference among the physicians with different qualifications was not significant (P value 0.141). Board certified doctors was the smallest group that perceived ruminator of patient burden as a barrier (3.3%) with only 20% of them considering it as a reason for not using insulin. Almost half of GPs (49.0%) regard patient burden as a barrier and 40.0% of diploma certified did so.

The associations between each barrier domain was studied with regard to the following factors: doctors' attendance at diabetes-related CME activities; total number of patients seen daily; total number of diabetics seen weekly; and doctors acknowledgment of starting or offering insulin. There was a significant negative correlation between the total perception of barriers and CME attendance (P value 0.03); number of diabetic patients seen per week; and doctors acknowledgment of starting or offering insulin (P value 0.00) (Table 6).

Table 3: Frequency distributions for Questionnaire items, all PHC physicians

	Items	Response		
		Agree to strongly agree (%)	Neutral (%)	Disagree to strongly disagree(%)
	Issues with the doctor's experience			
1	My reputation would suffer if I offered insulin therapy	9.6	19.3	71.1
2	I'm not familiar with insulin therapy	25.9	21.2	52.8
3	It is difficult to select the type of insulin	28	20.2	51.8
4	It is difficult to adjust the insulin dose	34	20.6	45.4
5	It is difficult to learn the methods of use of the many types of insulin injection devices (including insulin pens)	23.6	16.2	60.2
6	It is difficult to learn new methods of insulin therapy	13.1	18.8	68.1
7	My clinic is not equipped to provide insulin therapy	33.5	16.0	50.5
8	It is difficult to remember different types of insulin preparations	13.1	21.5	65.4
9	In principle, I would rather avoid diabetes patients	6.8	8.4	84.7
10	If necessary, I can refer the patient to a specialist	78.5	12.6	8.9
11	It is difficult to add insulin with oral hypoglycemic agent	16.8	19.9	63.4
	Burden related to explanations			
1	It is time-consuming to explain injection methods and the use of injection devices	46.3	13.7	40
2	It is time-consuming to explain hypoglycemia and its management	30.2	10.6	59.3
3	I do not have staff (nurses, pharmacists) who can assist with explanations	39.8	13.6	46.6
4	It is time-consuming to explain self-monitoring of blood glucose	38.2	12.0	49.7
5	It is difficult to provide guidance and education on insulin injection to patients	24	23.4	52.6
6	I do not have time to persuade patients to undergo insulin therapy or provide guidance on it	22.4	20.8	56.8
7	It is difficult to educate staff (e.g. nurses) about insulin therapy	12.4	18.7	68.9
	Consideration of burden on patients			
1	It is difficult to recommend insulin therapy considering the pain associated with it	22.8	17.6	59.6
2	The patient would have to pay more for treatment and monitoring	33.3	20.3	46.4
	Concerns regarding insulin therapy			
1	Patients would resist insulin therapy	76.7	17.1	6.2
2	I have concerns about the use of insulin therapy in elderly patients	61.3	22.5	16.2
3	Hospitalization is necessary to start insulin	13.5	10.9	75.6
4	There is a higher risk of hypoglycemia with insulin therapy compared to other therapies	73.1	10.9	16.1
5	Compliance with insulin therapy tends to be low	42.7	26.6	30.7

The more the doctors started and offered the use of insulin, the less they considered experience or the lack of it as a barrier (-0.320 correlation, P value 0.00), explanation (-0.166 correlation, P value 0.03) or patients' burden (-0.127 correlation, P value 0.90). Seeing more diabetic patients and frequent attendance at diabetes-related CME activities decreased most significantly the perception of doctors' experience as barriers (correlation -0.295, -0.191 with P value 0.00 and 0.01 respectively).

Table 4: Frequency distributions for Questionnaire items for PHC doctors without post-graduate qualification

	Items	Response		
	Issues with the doctor's experience	Agree to strongly agree (%)	Neutral (%)	Disagree to strongly disagree(%)
1	My reputation would suffer if I offered insulin therapy	9.3	19.8	71
2	I'm not familiar with insulin therapy	28.6	24.4	47
3	It is difficult to select the type of insulin	32.1	22.6	45.2
4	It is difficult to adjust the insulin dose	39.1	22.5	38.5
5	It is difficult to learn the methods of use of the many types of insulin injection devices (including insulin pens)	25.9	15.7	58.4
6	It is difficult to learn new methods of insulin therapy	13.3	21.1	65.7
7	My clinic is not equipped to provide insulin therapy	37.4	16.6	46
8	It is difficult to remember different types of insulin preparations	14.5	24.1	61.4
9	In principle, I would rather avoid diabetes patients	7.3	9.7	83
10	If necessary, I can refer the patient to a specialist	83.1	10.8	6
11	It is difficult to add insulin with oral hypoglycemic agent	18.7	22.3	59
	Burden related to explanations			
1	It is time-consuming to explain injection methods and the use of injection devices	46.1	15.1	38.8
2	It is time-consuming to explain hypoglycemia and its management	30.5	11	58.5
3	I do not have staff (nurses, pharmacists) who can assist with explanations	41	13.3	45.8
4	It is time-consuming to explain self-monitoring of blood glucose	36.1	13.9	50
5	It is difficult to provide guidance and education on insulin injection to patients	24.6	25.1	50.3
6	I do not have time to persuade patients to undergo insulin therapy or provide guidance on it	24.6	21.6	53.9
7	It is difficult to educate staff (e.g., nurses) about insulin therapy	11.9	19.6	68.5
	Consideration of burden on patients			
1	It is difficult to recommend insulin therapy considering the pain associated with it	25.6	19.0	55.4
2	The patient would have to pay more for treatment and monitoring	34.1	19.8	46.1
	Concerns regarding insulin therapy			
1	Patients would resist insulin therapy	75.6	17.3	7.1
2	I have concerns about the use of insulin therapy in elderly patients	63.5	22.2	14.4
3	Hospitalization is necessary to start insulin	15.5	11.9	72.6
4	There is a higher risk of hypoglycemia with insulin therapy compared to other therapies	74.4	10.7	14.9
5	Compliance with insulin therapy tends to be low	45.8	23.8	30.4

Table 5: Frequency distributions for Questionnaire items, PHC doctors with post graduate qualification (family medicine diploma and board certified)

	Items	Response		
	Issues with the doctor's experience	Agree to strongly agree (%)	Neutral (%)	Disagree to strongly disagree(%)
1	My reputation would suffer if I offered insulin therapy	12.0	16.0	72.0
2	I'm not familiar with insulin therapy	8.0	0.0	92.0
3	It is difficult to select the type of insulin	0.0	4.0	96.0
4	It is difficult to adjust the insulin dose	0.0	8.0	92.0
5	It is difficult to learn the methods of use of the many types of insulin injection devices (including insulin pens)	8.0	20.0	72.0
6	It is difficult to learn new methods of insulin therapy	12.0	4.0	84.0
7	My clinic is not equipped to provide insulin therapy	8.0	12.0	80.0
8	It is difficult to remember different types of insulin preparations	4.0	4.0	92.0
9	In principle, I would rather avoid diabetes patients	4.0	0.0	96.0
10	If necessary, I can refer the patient to a specialist	48.0	24.0	28.0
11	It is difficult to add insulin with oral hypoglycemic agent	4.0	4.0	92.0
	Burden related to explanations			
1	It is time-consuming to explain injection methods and the use of injection devices	48.0	8.0	44.0
2	It is time-consuming to explain hypoglycemia and its management	28.0	8.0	64.0
3	I do not have staff (nurses, pharmacists) who can assist with explanations	32.0	16.0	52.0
4	It is time-consuming to explain self-monitoring of blood glucose	52.0	0.0	48.0
5	It is difficult to provide guidance and education on insulin injection to patients	20.0	12.0	68.0
6	I do not have time to persuade patients to undergo insulin therapy or provide guidance on it	8.0	16.0	76.0
7	It is difficult to educate staff (e.g., nurses) about insulin therapy	16.0	12.0	72.0
	Consideration of burden on patients			
1	It is difficult to recommend insulin therapy considering the pain associated with it	4.0	8.0	88.0
2	The patient would have to pay more for treatment and monitoring	28.0	24	48
	Concerns regarding insulin therapy			
1	Patients would resist insulin therapy	84.0	16.0	0.0
2	I have concerns about the use of insulin therapy in elderly patients	45.8	25.0	29.2
3	Hospitalization is necessary to start insulin	0.0	4.0	96.0
4	There is a higher risk of hypoglycemia with insulin therapy compared to other therapies	64.0	12.0	24.0
5	Compliance with insulin therapy tends to be low	20.8	45.8	33.3

Table 6: Relationship between barriers and Qualification degree

Barrier		Postgraduate qualification					Pearson Chi-Square		
		No	FMD	FMB	others	Total	Value	df	p
Issues with the doctor's experience	N	51	0	0	1	52	15.09	3	0.002
	%	98.10%	0.00%	0.00%	1.90%	100.00%			
	% within Qualification	35.20%	0.00%	0.00%	9.10%	28.70%			
Burden related to explanations	N	57	4	2	5	68	4.05	3	0.256
	%	83.80%	5.90%	2.90%	7.40%	100.00%			
	% within Qualification	38.00%	40.00%	13.30%	45.50%	36.60%			
Consideration of burden on patients	N	76	4	3	7	90	5.46	3	0.141
	%	84.40%	4.40%	3.30%	7.80%	100.00%			
	% within Qualification	49.00%	40.00%	20.00%	58.30%	46.90%			
Concerns regarding insulin therapy	N	131	7	8	6	152	12.12	3	0.007
	%	86.20%	4.60%	5.30%	3.90%	100.00%			
	% within Qualification	84.50%	70.00%	61.50%	50.00%	80.00%			
Total	N	57	2	0	2	61	11.20	3	.011
	%	93.40%	3.30%	0.00%	3.30%	100.00%			
	% within Qualification	40.40%	20.00%	0.00%	18.20%	34.90%			

Table 7: Correlation between each dimension and attendance of DM related CME, number of patients seen daily, number of diabetic patients seen weekly, number of diabetic started insulin, number of diabetics offered insulin

Barrier		Diabetes related CME	Daily patients seen	Weekly diabetics seen	Starting insulin	Offering insulin
Issues with the doctor's experience	Pearson Correlation	-0.191	.003	-0.295	-0.320	-0.320
	p	.011	.972	.000	.000	.000
Burden related to explanations	Pearson Correlation	-.045	.138	-.061	-0.166	-0.166
	p	.551	.063	.420	.028	.028
Consideration of burden on patients	Pearson Correlation	-.123	.097	-0.154	-.127	-.127
	p	.094	.183	.037	.090	.090
Concerns regarding insulin therapy	Pearson Correlation	-.028	-.004	-0.166	.011	.011
	p	.708	.953	.026	.883	.883
Total	Pearson Correlation	-0.164	.081	-0.270	-0.298	-0.298
	p	.032	.290	.000	.000	.000

Discussion

The aim of this study was to assess the prevalence of insulin initiation for type 2 diabetic patients by PHC physicians in the Eastern Province, Saudi Arabia, and to explore physicians' perception of barriers to the initiation of insulin. The results showed that primary care physicians faced many obstacles when considering initiating insulin for type 2 diabetic patients. Only half of the participants reported experience with the initiation of insulin for at least one diabetic patient, which is considered very low compared to the Japanese study (DAWN), in which most of the participants had experience with insulin therapy (13). The majority of physicians who initiated insulin were PHC physicians with no post - graduate qualifications (62 of the 157 i.e. 40.8 %). On the other hand, initiation of insulin was higher among PHC physicians with postgraduate qualifications (family medicine). This was consistent with the Kunt and Snoek finding (14).

For less than one third of the doctors, their perceived lack of experience (knowledge and attitude) with insulin seemed to be a barrier to the initiation of insulin. This gap was much more obvious with PHC physicians with no postgraduate qualification. The focused training and exposure to diabetic patients during postgraduate education seemed to improve knowledge and helped to change attitudes (15).

The Almesned study recommended an early introduction of diabetes training in undergraduate education(16). This can equip the newly graduated physician with adequate knowledge and skills together with the appropriate attitudes to deal with diabetic patients, and the confidence to prescribe insulin when indicated.

The most important obstacles relating to giving explanation to patients were the constraints of time: having enough time to explain injection methods, hypoglycemia and self-monitoring of blood glucose. Nearly half of the physicians' concerns were with the problem of having adequate time to explain injection devices. More than half of family physicians and more than one third of PHC physicians without postgraduate qualifications regarded explanation of self-monitoring of blood glucose as time consuming.

This finding is consistent with other studies done by Haque et al, Hayes et al and al Mesned et al (2, 15, 16).

The perception of barriers to giving explanations has no relationship with postgraduate qualification, which further suggests that these barriers relate to the health care system in Saudi Arabia. Incorporating some system focused interventions can reduce the barriers to giving explanations. For example, providing patients with specially prepared explanatory materials can facilitate the process and reduce the burden of explaining (17). In addition, preparing patients for insulin and arriving at the decision to give insulin does not have to be done in a single session. There should be a number of close consultations and discussions culminating in an agreement. All primary health care centers have chronic disease nurses who together with the care physicians are supposed to form the diabetes management team especially with regard to education. Giving chronic disease nurses the necessary education on diabetes and encouraging them to acquire certification on diabetes management will make the process of explaining much more manageable.

This study found that more PHC physicians with no postgraduate qualifications were concerned about the pain that accompanies insulin injection; however, this difference was not statistically significant when compared with postgraduate qualified doctors. The literature reveals that factors that contribute to injection pain include: the length and diameter of the needle, injection techniques and inadvertent IM injection (18). Moreover, some diabetic patients anticipate injection pain based on their previous experience, while others have a real needle phobia. There are various ways of minimising injection pain, such as giving adequate explanation, training, and introduction of new devices like the insulin pen etc. However, for a patient with injection phobia, psychological counselling would be necessary.

One third of the physicians also showed concern about increasing the financial burden of their patients. This is consistent with other studies done in Japan and South Africa. (11,13). As with many other anti-diabetes medications, different types of insulin including those administered with pens are available at the PHC centers. In addition, glucometers and strips can be provided, at no extra cost to all diabetics on insulin by Saudi MOH. Proper and timely coordination of care between physicians, pharmacists and the central pharmacy might ensure the availability and accessibility of these essential tools.

This study highlights significant concerns on insulin therapy. It seems that the majority of physicians without postgraduate qualifications perceived more barriers including: the use of insulin in the elderly; patient resistance; need for hospitalization; and lack of compliance by patients if prescribed. Most PHC physicians without PGQ perceived the initiation of insulin in the elderly as problematic. On the other hand, family physicians seemed to be less conservative and more inclined to following the guidelines that advocate individualizing the decision on initiating insulin rather than avoiding it (19). The second concern was the anticipation of patients' resistance to initiating insulin. This is also in accord with other PHC based studies in which the majority of PHC physicians agreed on the "psychogenic resistance" in their diabetic patients (20). Family physicians completely rejected the idea of admitting a diabetic patient for the sole purpose of starting insulin, though a few of the GPs held the opposite view.

The reason for this could be the smallness of the proportion of physicians who have experience with insulin.

This study showed a significant correlation between the perception of obstacles and the number of factors (Table 7) including: previous experience with insulin (initiation

or offering insulin to patients), the number of diabetes-related CME activities attended and the number of diabetic patients seen weekly. This important correlation matches the learning theory that repetitive encounters with a new concept enhances the process of learning and facilitates the conceptualization of the new learning event (21).

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