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Attitudes towards insulin initiation in type 2 diabetes patients among healthcare providers: A survey research

Javier Escalada [a], *Domingo Orozco-Beltran* [b], *Carlos Morillas* [c], *Fernando Alvarez-Guisasola* [d], *Fernando Gomez-Peralta* [e], *Manel Mata-Cases* [f,g], *Rafael Palomares* [h], *Rosario Iglesias* [i], *Concepción Carratalá-Munuera* [b,*]

[a] *Clínica Universidad de Navarra, Pamplona, Spain*
[b] *University Miguel Hernandez, San Juan de Alicante, Spain*
[c] *Peset University Hospital, University of Valencia, Valencia, Spain*
[d] *La Calzada Primary Health Care Centre, Gijón, Spain*
[e] *Segovia General Hospital, Segovia, Spain*
[f] *Primary Health Care Centre La Mina – Institut Català de la Salut, Sant Adrià de Besòs, Barcelona, Spain*
[g] *Institut Universitari d'Investigació en Atenció Primària Jordi Gol, Barcelona, Spain*
[h] *'Reina Sofía' University Hospital, Cordoba, Spain*
[i] *Primary Care Health Centre Pedro Laín Entralgo, Alcorcon, Madrid, Spain*

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ABSTRACT

Aims: To describe the views of healthcare providers about starting insulin in patients with type 2 diabetes and to determine the specific factors that contribute to delay insulin initiation.

Methods: Two-phases observational descriptive study. In the quantitative phase we conducted a cross-sectional survey of a sample of 380 healthcare professionals (general practitioners (GPs), endocrinologists, internists and nurses). In the qualitative phase, a discussion group reviewed the results of the survey to propose solutions.

Results: In poorly controlled patients, 46% of GPs vs. 43.2% of internists and 31.3% of endocrinologists waited 3–6 months before starting insulin, and 71.4% of GPs vs. 66.7% of internists vs. 58.8% of endocrinologists need to confirm twice the HbA1c levels. The upper level of basal glucose more frequently considered as good control is 130 mg/dL for GPs (35.7%), and 120 mg/dL for internists (35.8%) and endocrinologists (37.5%). In patients without comorbidities, 32.5% of endocrinologists vs. 27.2% of internists vs. 17.9% of GPs initiated insulin when HbA1c was >7% while 26.3% of endocrinologists vs. 28.4% of internists vs. 38.4% of GPs initiated insulin when HbA1c was >8%. The interference of the therapy with the patient' social life and the need for time management were the most accepted barriers to initiate insulin.

* Corresponding author at: Ctra. Nnal. 332 s/n, San Juan de Alicante 03550, Spain.
E-mail addresses: fescalada@unav.es (J. Escalada), dorozcobeltran@gmail.com (D. Orozco-Beltran), cmorillas@telefonica.net (C. Morillas), f.a.guisasola@gmail.com (F. Alvarez-Guisasola), fgomezperalta@gmail.com (F. Gomez-Peralta), manelmatacases@gmail.com (M. Mata-Cases), rafapalomares@clinicasierrabella.es (R. Palomares), chiglesiasgonzalez@gmail.com (R. Iglesias), ccarratalm@gmail.com (C. Carratalá-Munuera).

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Conclusions: There are significant differences between GPs and endocrinologists regarding the insulin initiation and GPs and internists felt less empowered to manage patients with diabetes. Specific training for professionals and joint work with patients could improve the glycemic control.

1. Introduction

Diabetes is currently among the top five causes of death in most high-income countries and resulted in 4.6 million deaths globally in 2011 [1]. The prevalence of diabetes, particularly type 2 (T2DM), continues to grow at an unprecedented rate [2]. In 2011, 360 million persons had diabetes, of which 95% have T2DM. In 2030, there will be approximately 552 million persons with diabetes [3].

Strict glycemic control in T2DM can prevent the onset and progression of complications [4]. Despite of numerous interventions to improve adherence to the recommended standards have been implemented, control is improving, but slowly [5].

Based on recent large clinical trials there is a growing current of opinion that no single hemoglobin A1c (HbA1c) target is appropriate for all patients. The American Diabetes Association (ADA) suggests a fundamentally patient-centered approach to determine an individual's HbA1c target. However, the ADA also recommends a HbA1c target level of less than 7% for the majority of patients [6].

Due to the progressive nature of T2DM, insulin therapy is eventually indicated for many patients with T2DM [5]. The progressive nature of T2DM and its therapies should regularly be explained in a matter-of-fact manner to patients, avoiding using insulin as a threat or describing it as a failure or punishment [6]. If a patient presents with significant hyperglycemic symptoms and/or has dramatically elevated plasma glucose concentrations insulin therapy should be strongly considered from the outset [7]. But in most patients insulin is prescribed after combination therapy with metformin and an additional 1–2 oral or injectable agents [7]. When good glycemic control is not achieved despite other optimal anti-diabetic agents, insulin should be initiated. But, progression to insulin is frequently delayed, causing unnecessary prolonged periods of hyperglycemia and preventable complications downstream [8]. Primary Care is central to addressing this delay in initiation of insulin treatment [9]. Insulin initiation is a complex social process and this should be reflected in clinical practice guidelines. A better understanding of the barriers to insulin initiation in physicians may improve the control of patients with diabetes control and reduce complications [10]. In Spain, patients with T2DM are managed by general practitioners (GPs), endocrinologists or physicians in other specialties as internists [11]. Internists provide diagnoses and nonsurgical treatment for a variety of medical conditions and around 40% of patients have diabetes. Most of patients with diabetes treated by internists are elderly patients with acute or chronic comorbidity who are admitted to internal medicine due to the associated pathology or a complication of diabetes. The role of nurses in helping patients to control T2DM-associated morbidity and mortality is becoming increasingly important [12]. This study aims to describe the views of GPs, specialists and diabetes nurses about starting insulin in patients with T2DM and to determine the specific factors that contribute to delay insulin initiation among healthcare providers.

2. Material and methods

This observational descriptive study was carried out by using quantitative and qualitative methods. This multicenter study was conducted in Spain between September 2012 and April 2013.

2.1. *Cross-sectional survey*

In the first quantitative phase of the study we conducted a cross-sectional survey of a national sample of 380 healthcare professionals who were classified as GPs, endocrinologists, internists and diabetes nurses from 20 community health centers and 8 hospitals from the Spanish National Health System. The participants were selected from scientific societies (family medicine, internal medicine, endocrinology and nursing) and were invited to participate without personal presence. Eligibility criteria were: 1) more than 5 years of experience, 2) responsible for managing diabetes treatment. This study used snowball sampling, i.e. "key opinion leaders" members recruit additional participants. After written informed consent was obtained, we administered an online survey to all professionals who accepted.

A structured questionnaire was designed by the coordinating project group. The online questionnaire consisted of three parts with 32 questions in total. In the first part of the survey 4 questions about demographic characteristics such as age, gender and years of experience were asked. The second part (not for nurses) included questions relating to prescription habits and treatments as well as questions about the profile of patients. In the last part of the questionnaire, in order to assess the theoretical barriers to insulin initiation, participants were asked how much they agreed to statements regarding barriers to insulin initiation. These barriers were identified from previous literature and were assessed by using 5-point Likert scale (Strongly disagree/Disagree/Not sure/Agree/Strongly agree). In addition, two multiple choice questions were asked: (1) About which of the following issues are you most worried?; (2) When the insulin therapy is initiated, which is the main barrier for patients? We piloted the instrument before administration of the survey and it was distributed online on October 2012, with two follow-up emails.

2.2. Online discussion group

The second phase of the study was qualitative and its objective was to identify the key topics concerning the barriers to insulin initiation and then propose solutions make through the results of the survey by using online discussion group. We set up a discussion group consisting of four endocrinologists and four GPs who had at least 10 years of professional experience treating patients with T2DM, held a leading position in diabetes related organizations for science or health care professionals or had recent publications on aspects of diabetes care.

We set the duration of discussion sessions to two hours, and two rounds of comments and revisions were obtained before the authors reconciled the solutions and edited the final document. In the first session, discussion group was provided with the results of the survey and the moderator asked them an open question: 'What do you recommend to avoid the insulin initiation delay?' The comments and the initial proposals were analyzed by the coordinating project group and the insights were redistributed to the discussion group for comments and assessment. The second session consisted of one consensus meeting in which the members of the group discussed their views and reached their conclusions. Based on the conclusions from the consensus meeting, the coordinating project group edited a final proposal about starting insulin therapy in patients with T2DM.

2.3. Statistical analysis

Sample size was based on the Spanish statistical database which estimated a population of 45,000 GPs, endocrinologists, internists and diabetes nurses in 2011. With a 95% confidence level, within an error margin of 6%, the sample size requirement was 266. In case of a response rate of 70%, a sample of 380 healthcare professionals is needed. No simple size was calculated for the discussion group since there is a lack of agreement around the expert sample size in qualitative method [13]. A descriptive statistical analysis of the first phase results was performed. The qualitative variables are expressed as the values and percentages, the quantitative variables as the mean and standard deviation (SD). For the bivariate analysis, the Chi-square and Student's t-tests were used to compare qualitative and quantitative variables respectively. A $p < 0.05$ was considered as significant. Confidence intervals of 95% were calculated. There were no missing data since the incomplete questionnaires were excluded. Data were analyzed with SPSS 20.0.

2.4. Ethical considerations

All study procedures were approved by the Institutional Review Board.

3. Results

3.1. Cross-sectional survey

Response rate to the survey was 89.5% ($n = 340$) and 17 incomplete questionnaires were excluded 34.7% ($n = 112$) of them were GPs, 24.8% ($n = 80$) were endocrinologists, 25.1% ($n = 81$) were internists and 15.5% ($n = 50$) were nurses. 79.7% of participants worked at public institutions. Demographics of the cohort stratified by occupation are noted in Table 1. Nurses answered only the questions which were applicable for them.

Table 2 shows the results of the survey relating to participants' opinion about prescription habits for diabetes treatment, including insulin. Regarding the level of HbA1c for insulin therapy initiation, we asked participants to choose the best option for older patients with and without comorbidities, as the clinical guidelines recommend (Fig. 1).

Regarding participants opinion about the barriers to insulin initiation, the results of the Likert questionnaire are shown in Fig. 2. And in regard to the two multiple choice questions, all participant groups chose hypoglycemia (89.5%) as their most worrying issue and 'fear of needles' (64.1%) as the main patient barrier to insulin initiation without significant differences between groups.

Table 1 – Demographic characteristics of the survey responders.

Variable	GPs	Endocrinologists	Internists	Nurses	Total
N (%)	112 (34.6)	80 (24.8)	81 (25.1)	50 (15.5)	323 (100.0)
Female gender, *n* (%)	33 (29.5)	32 (40)	24 (29.6)	43 (86)	124 (38.4)
Age range in years, mean (SD)	48.8 (4.5)	43.1 (4.1)	43.3 (4.2)	47.3 (4.7)	47.3 (4.0)
Type of center, *n* (%)[#]					
Primary care	81 (72.3)	2 (2.5)	2 (2.5)	32 (63.6)	204 (63.3)
Spec. Amb. Care	10 (8.9)	15 (18.8)	7 (8.6)	5 (36.4)	36 (11.2)
Public hospital	14 (12.5)	58 (72.5)	71 (87.7)	17 (36.4)	74 (22.9)
Private center	25 (22.4)	26 (32.3)	17 (20.9)	10 (18.2)	71 (22.2)
Years of experience, mean (SD)	21.5 (2.2)	16.0 (1.9)	16.1 (2.1)	17.1 (3.1)	20.2 (2.2)
Assigned T2DM patients, *n* (%)					
>150	26 (23.2)	58 (72.5)	32 (39.5)	19 (38)	91 (28.1)
101–150	35 (31.2)	17 (21.3)	23 (28.4)	9 (18)	93 (28.7)
50–100	41 (36.6)	3 (3.8)	20 (24.7)	13 (26)	107 (33.2)
<50	10 (8.9)	2 (2.5)	6 (7.4)	9 (18)	33 (10.1)

Spec. Amb. Care. : Specialized Ambulatory Care; T2DM: Type 2 Diabete Mellitus; GPs: General practitioners.
[#] A health provider could choose more than one option.

Table 2 – Results of the survey relating to prescription habits and treatments.

	GPs N = 112	Endocrinologists N = 80	Internists N = 81	p-Value
Which diabetes guidelines do you often use?				
ADA-EASD	48.2*	78.8	74.1	<0.05
RedGEDAPS	30.4*	7.5	9.9	<0.05
SED	23.2	48.8*	33.3	<0.05
Other	12.5	31.4	13.6	
None	21.4	3.8*	12.3	<0.05
After failure with metformin, which treatment do you often use?				
DPP-4 inhibitors	58.0*	72.5	75.3	<0.05
Sulfonylureas	28.6	25.0	17.3*	<0.05
GLP-1 RA	18.8	28.8	16.0	
Insulin	17.9	16.3	24.7	
Other	25.9	8.8	19.7	
After oral therapy failure with two agents, which treatment do you often use?				
Insulin	70.5	52.5*	69.1	<0.05
DPP-4 inhibitors	17.9	12.5	14.8	
Sulfonylureas	14.3	21.3	11.1	
GLP-1 RA	7.1*	25.0	21.0	<0.05
Other	16.1	17.6	13.5	
If the oral therapy does not achieve target levels, how long it takes to start insulin therapy?				
1–2 years	0.9	0.0	0.0	
6 months–1 year	9.8	6.3	3.7	
3–6 months	46.4	31.3	43.2	
<3 months	42.9*	62.5	53.1	<0.05
Before insulin initiation, how many times do you confirm HbA1c level?				
Three times	13.4*	0.0	2.5	<0.05
Twice	71.4*	58.8	66.7	<0.05
One	15.2*	41.3	30.9	<0.05
Which type of insulin do you use to initiate the treatment?				
Glargine	54.1	63.8	66.7	
NPH	21.4*	5.0	6.4	<0.05
Detemir	17.3	23.8	19.2	
Mixture	6.1	7.5	5.1	
Rapid-acting analog	1.0	0.0	2.6	
Which basal insulin dose do you use when you initiate insulin therapy?				
0.2 U/kg b.w	33.9*	61.3	49.4	<0.05
0.1 U/kg b.w	36.6	16.3*	28.4	<0.05
10 U	20.5	15.0	14.8	
According to patient	2.7	1.3	2.5	
Other	6.2	6.3	4.9	
Which upper limit of fasting blood glucose do you use as good control target in insulin treated patients?				
100 mg/dL	5.4	16.3	7.4	
120 mg/dL	24.1	37.5	35.8	
130 mg/dL	35.7	32.6	19.8	
140 mg/dL	32.1	13.8*	34.6	<0.05
>140 mg/dL	2.7	0.0	2.5	

ADA-EASD: American Diabetes Association-European Association for the Study of Diabetes; RedGEDAPS Primary Care Diabetes Spanish Guideline; SED: Spanish Society of Diabetes Guideline; GLP-1 RA: Glucagon-like peptide-1 receptor agonists; NPH: Neutral Protamine Hagedorn; b.w.: body weight.

* It is significantly different.

3.2. *Online discussion group*

The eight members of the discussion group attended the online meetings. In the first session, in order to avoid the insulin initiation delay, the discussion group made recommendations as follows: (1) it is necessary a specific training for physicians and diabetes nurses in primary care setting who showed to have concerns regarding the management of insulin treatment; (2) HbA1c test every 3 months should be done in patients with poorly controlled T2DM; (3) to set personalized targets is recommended but there should be no significant differences between GPs and specialists; (4) the optimization of insulin dose is more important than the initial dose and; (5) to overcome the preconceived ideas of the patients about insulin therapy, care providers must work with them from the beginning of the disease.

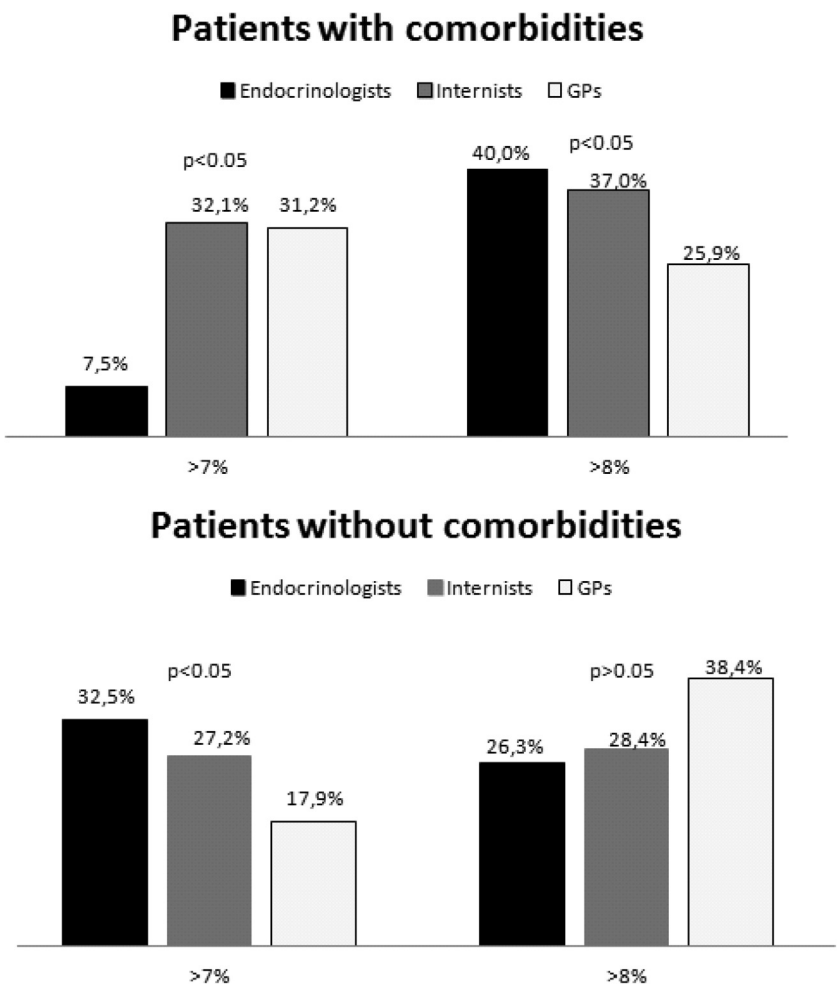


Fig. 1 – Level of hemoglobin HbA1c to initiate insulin therapy in older patients.

After the revision of the results by the coordinating project group, a summary of the proposals were sent to the discussion group. In the second session, members of the discussion group took in account the differences between GPs, endocrinologists and internists when they manage the insulin initiation and that the survey results revealed that less than 50% of GPs and internists agreed that the insulin is more effective than oral therapy. They made recommendations as follow: (1) specific and consensual training for all professionals who manage patients with diabetes; (2) to reinforce insulin therapy as the most effective treatment; (3) to add basal insulin to OAD for early glycemic control and; (4) to work jointly with associations to improve patient education.

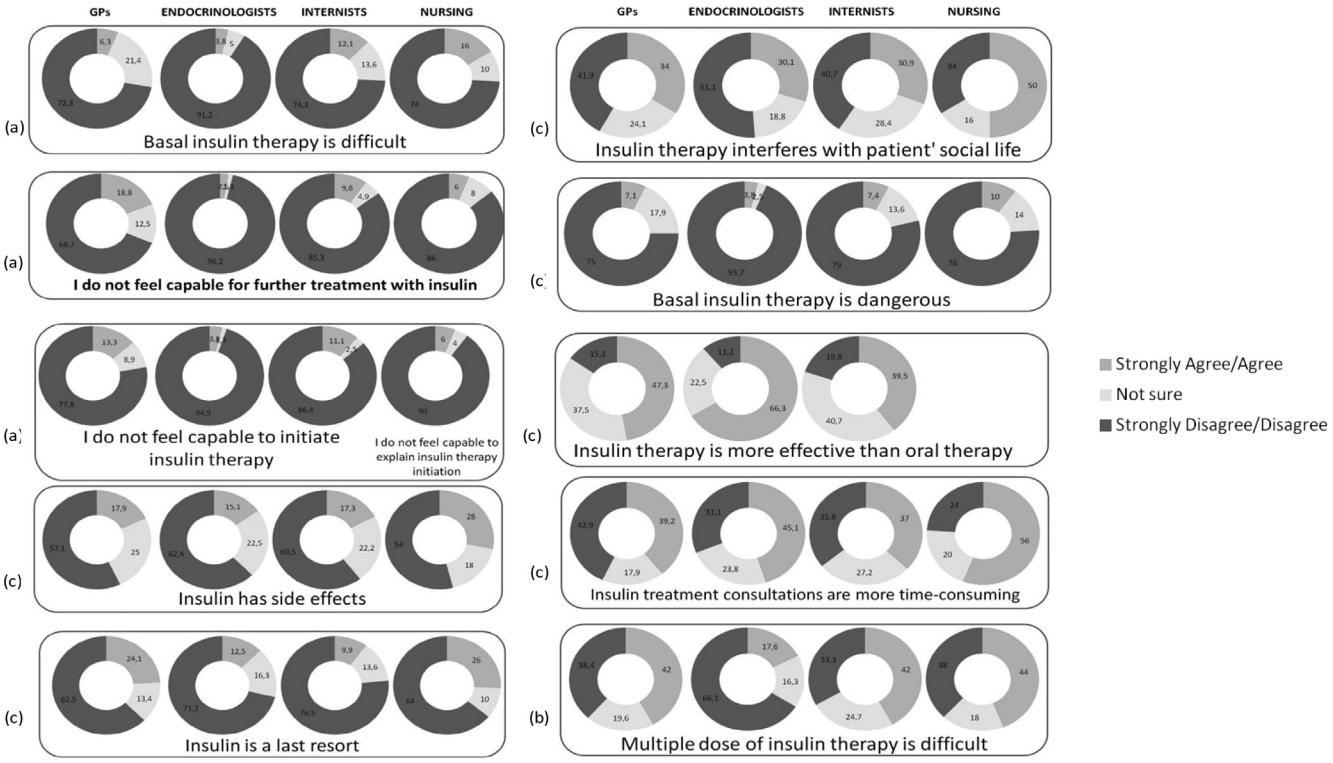
Finally, the coordinating project group reviewed the results of the second session and group edited a final proposal about starting insulin therapy in patients with T2DM (Table 3).

4. Discussion

This study showed how healthcare providers manage T2DM during their daily practice and the findings illustrated differences between GPs, endocrinologists and internists. In addition, the barriers to initiate insulin therapy in patients with T2DM were analyzed and healthcare providers agreed in some barriers: to consider insulin as the last resort, the side effects, thinking insulin is 'dangerous' or the insulin interferes with patient's social life. However, they considered insulin as the most effective therapy and did not think that 'basal insulin therapy is difficult'.

The findings of this study showed that the ADA-EASD was the most used guideline by most of participants as a reference guide for the treatment of T2DM (Table 2), especially by endocrinologists and GPs. The relationship of guideline use to diabetes-related knowledge and decision making by providers has not been formally described in previous studies but it may help to identify areas of need for further training and continuing diabetes education [14]. Studies on guidelines implementation among Spanish professionals found primary care physicians tended to implement guidelines–more closely related to their field of medical practice while specialists tended to use the guidelines of specialized national or international scientific societies [15].

Our results showed that GPs take more time to start insulin than other specialists and need to confirm levels of HbA1c more times. In patients with poor glycaemic control, most of GPs waited more than 3 months before insulin therapy is initiated and confirmed twice HbA1c measures. Initiation of insulin therapy was frequently delayed for many



(a) Significant difference between endocrinologist and GPs groups p< 0.05; (b) Significant difference between endocrinologist and internist groups p< 0.05; (c) No siginficant differences

Fig. 2 – Agreement and disagreement regarding barriers to insulin initiation.

sub-optimally controlled patients with diabetes, as shown in a number of surveys [16–18]. Previous research found that the mean time to initiate insulin was 9.2 years since T2DM diagnosis and the mean HbA1c value was 9.5% before insulin initiation [19]. Another study suggested that some GPs had beliefs about insulin that were inconsistent with their diabetes treatment goals [20]. Agarwal et al. stated that many GPs felt providing diabetes care caused a high clinical burden and increased the need for greater vigilance. The lack of experience made some apprehensive about insulin initiation [21]. Furler et al. suggested that many GPs delayed a decision to initiate insulin, as the process of initiating insulin is not congruent with their usual work practices. By contrast, a Canadian survey found that GPs used higher doses of insulin than other specialists who used oral therapy longer [22]. Clarification in the roles of each health professional in initiating insulin may be an important prerequisite for therapeutic progress and clinical guidelines for T2DM care in general practice make little direct reference to this issue [10].

In this study (Fig. 1), in patients with comorbidities, GPs and internists chose to initiate insulin therapy at lower level of HbA1c than endocrinologists despite the guidelines recommendations [5–7,23,24]. Otherwise in patients without comorbidities, endocrinologists preferred to initiate insulin therapy at a lower level of HbA1c than GPs and internists. This topic must be confirmed or not with other studies as there was no consensus between healthcare providers and it is very important to be less aggressive in patients with comorbidities where the objective of prevention of complications could be impossible.

Table 3 – Summary of the solutions proposed by the discussion group.

Challenges of insulin initiation
To set personalized targets reminding the current targets recommended by guidelines
To recommendHbA1c test every 3 months in patients with poorly controlled Type 2 diabetes and take action
Patients may benefit from early treatment with basal insulin added to oral antidiabetic drug (OAD) through early glycemic control (metabolic memory can reduce complications)
To reinforce insulin therapy as the most effective treatment
To initiate insulin therapy with basal insulin reaching for optimal dose. Optimization is more important than initial dose
To work jointly with patients and associations to improve education and overcome barriers and preconceived ideas about insulin therapy
Specific training for physicians and diabetes nurses with clear and well defined concepts that enable action and help to overcome inertia and barriers

Regarding barriers to insulin initiation (Fig. 2), the fact that the therapy with insulin interferes with patient's social life and that the insulin treatment consultations are more time-consuming were the most accepted barriers by the participants of this survey research. Diabetes nurses were the group who felt the most concern about these issues. Practice nurses could play a key role in facilitating the initiation of insulin in general practice [10] and in hospitals. Nurses can screen patients for early diabetes identification, recognize and initiate corrective measures for inadequate treatment regimens, help patients set and achieve therapeutic goals, and assess diabetes-related complications as they arise [12]. In regard to capability, all professionals (GPs, endocrinologists and internists) considered that to initiate basal insulin therapy or to follow-up patients treated with insulin is not difficult. However, our findings illustrated GPs and internists felt less empowered to manage these patients and think that the multiple-dose insulin regimens are difficult to manage.

Previous studies have suggested that barriers to insulin initiation lie in 'psychological resistance': health providers' incomplete knowledge of the rationale and belief in the safety of starting insulin and patient fears and misconceptions [25,26]. This study identified that barriers to insulin initiation also occur because of patient resistance and it is thought the main patient barrier to insulin initiation is "fear of needles". Providers, on the other hand, accepted they may fear hypoglycemia and had concern for their patients' safety. Similarly, in another study the major reasons cited by physicians were concerns about patients' ability to comply with therapy, as well as the risks of hypoglycaemia associated with insulin therapy. About patient reasons, "dreading take their injections" appeared as the main cause [27].

In the qualitative phase of the study (Table 3), the expert group highlighted the importance of individual's HbA1c targets as guidelines recommend. As there was no consensus about HbA1c target level, one reason could be that the guidelines are poorly understood or deemed unreliable. New themes emerging from the discussion group included the importance of working jointly with patients and associations. Recent publications found that most of adverse events in patients with diabetes have been attributed to physician–patient communication problems [28]. To overcome the psychological insulin resistance experienced by the patient, it is important to begin the conversation early and talk about diabetes as a progressive disease that eventually most people with T2DM will require insulin to achieve normal blood glucose [27].

The expert group requested training for physicians and diabetes nurses in order to clarify doubts about monitoring patients with diabetes (dose adjustments, intensification of therapy and therapeutic education for patients) and to empower the decision of GPs to initiate insulin therapy and patient acceptance through shared decision-making. Healthcare professionals should be trained how to initiate insulin and communicate effectively with patients from various cultural and religious backgrounds [29]. The lack of consensus about diabetes management emphasizes the necessity of medical education programs that increase knowledge about diabetes and about the physiological effects of insulin.

4.1. *Strengths and limitations*

This study showed the views of different healthcare providers who attend patients with T2DM. Individual surveys generally cannot provide strong evidence of cause and effect but they allow exploring aspects of a situation, or to seek explanation and provide data for testing hypotheses. In addition, there was a lack of concordance among healthcare providers in several questions of the quantitative phase. This may be because each professional group sees patients with different characteristics or in different stages of the evolution of the disease. Regarding the qualitative phase, this research is limited in that it represents the opinions and consensus of a group and has all the typical limitations of expert panels. The results may be biased due to the snowball recruitment strategy since the sample might include an over-representation of individuals with similar characteristics. In addition, the opinion of professionals might fluctuate due to new evidence and knowledge and future revisions may significantly change the recommendations. However, this kind of study allows knowing the professional 'opinion which determines the prescriptions.

This study reports the opinion of the healthcare providers in regard to the insulin therapy. However, further research is needed to know the views of patients with diabetes.

After knowing the possible reasons to delay insulin therapy, the national health system should take action to overcome them and, thus, the control of patients with T2DM would improve and consequently, the complications and costs involved in resolving them might be reduced.

Conflicts of interest

None.

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