The Perspectives of Physicians Regarding Antidiabetic Therapy De-Intensification and Factors Affecting their Treatment Choices: A Cross-Sectional Study

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Abstract

Background: Comprehensive diabetes management includes an appropriate dietary plan, exercise, and antidiabetic medications. Nevertheless, the target glycaemic control is not always achieved using single antidiabetic, patients may need to start treatment intensification by increasing the dose of the single antidiabetic agent or by the administration of antidiabetic combination therapy. However, it has been shown that intensive antidiabetic therapy should be used carefully as it is associated with an increased risk of adverse events and death. The aim of this study is to understand physicians' perspectives regarding treatment de-intensification and factors affecting their treatment choice for patients with type 2 diabetes mellitus.

Methods: A cross-sectional study was conducted in governmental specialised primary and secondary care units in Saudi Arabia using online questionnaire. Two previously validated questionnaires were used to understand physicians' awareness of, agreement with, and their practices of individualising HbA1c goals and antidiabetic treatment de-intensification, and to assess factors affecting physicians' treatment choice when prescribing antidiabetic treatment for patients with type 2 diabetes mellitus. Study population were physicians who are treating patients with diabetes mellitus during the period between October 2018 and May 2019.

Results: A total of 205 physicians have participated in the study. Approximately 50% of physicians had family medicine speciality (n = 98, 47.8%). The majority of physicians (n = 183, 89.3%) were familiar with the concept of HbA1c goals individualisation. However, only 66.3% of them (n = 136) reported that they apply it either always or most of the time. 58.5% (n = 120) of physicians reported that they would not initiate conversations about de-intensifying antidiabetic therapy even if their patients had a stable HbA1c values for one year. Physicians showed higher consideration to objective patient clinical data and their assessment of patient's health status, with minor consideration to patient-related factors.

Conclusions: Healthcare professionals should focus more on implementing contemporary practices and applying any necessary treatment de-intensification. Subjective patient factors should be taken into account, as these factors are associated with better disease management.

Background

The worldwide prevalence of diabetes mellitus (DM) in 2019, was 9.3%, while in Saudi Arabia a higher prevalence rate was reported (15.8%) putting an immense burden on the healthcare system. Direct expenses on diabetes in Saudi Arabia exceeded 13.9% of the total health expenditure [1]. Unless a patient-centred, comprehensive multidisciplinary approach is enforced for the management of DM, the disease burden on Saudi Arabia will continue to escalate to an alarming level [2].

Furthermore, due to the progressive nature of DM, patients need to be treated efficiently to prevent the development of microvascular and macrovascular complications [3]. Comprehensive diabetes management includes an appropriate dietary plan, exercise, and antidiabetic medications. Nevertheless,

the target glycaemic control is not always achieved using single antidiabetic medication due to the developing nature of the disease, patients may need to start treatment intensification [4, 5]. Treatment intensification can be done either through increasing the dose of the single antidiabetic agent, by the administration of antidiabetic combination therapy or by the addition of insulin therapy [6].

Treatment guidelines recommend the use of intensive antidiabetic therapy for patients with uncontrolled DM [7–10]. A previous large randomised trial reported that intensive antidiabetic therapy is associated with marked reduction in the risk of developing microvascular and macrovascular complications among type 2 diabetes mellitus patients [11]. Another large database study found that delay in treatment intensification is associated with multiple life-threatening complications such as myocardial infarction, stroke and heart failure [12]. There are different variables that are reported to be associated with the need to treatment intensification in patients with diabetes mellitus such as high HbA1c value (8.0% and above), long duration of the disease and presence of other comorbidities [13]. However, aggressive pharmacological treatment to achieve HbA1c targets may not be advisable or even practical and one size-fit all approach is not recently recommended. An enlightened patient-centred approach that determines individualised goals for each patient with ongoing follow up is recommended [14]. Intensive antidiabetic therapy should be used carefully as it is associated with an increased risk of adverse events and death [15.] One of the leading adverse events associated with intensive antidiabetic therapy is hypoglycaemia [16–18]. There are limited guidelines that address antidiabetic treatment de-intensification in order to decrease the burden of the associated hypoglycaemic episodes [19]. The excessive burden of DM, and the high prevalence of intensive antidiabetic therapy or as it is called "diabetes over-treatment", increased the importance of exploring how physicians perceive this approach. This study aimed to understand physicians' perspectives regarding anti-diabetic treatment de-intensification and factors affecting their treatment choices for patients with type 2 DM.

Methods

Study design and study population

A cross-sectional survey study was conducted using two previously validated questionnaires during the period between October 2018 and May 2019. Genere and colleagues' questionnaire, which was developed to understand physicians' awareness of, agreement with and their practices of individualising HbA1c goals and antidiabetic treatment de-intensification. In addition, it has been used to identify HbA1c level at which physicians start treatment de-intensification and what important patient factors that motivate them to consider such practice [20]. Grant and colleagues' questionnaire, which was used to assess factors affecting physicians' treatment choice when prescribing antidiabetic treatment for patients with type 2 DM has been used [21].

Sampling and recruitment

According to the latest available statistics in Saudi Arabia, the total number of registered physicians is around 10,641 [22]. At a confidence interval of 95%, standard deviation of 0.5, margin of error of 5%, the required sample size was 371 physicians. Physicians from any related speciality, whether general practitioners, internists, or endocrinologists were invited to participate in the study. The inclusion criteria were any physician who currently practising his job and treating patients with type 2 DM.

A convenience sample of all eligible physicians who are registered in the Ministry of Health of Saudi Arabia was invited to participate in the study. This sampling technique is a type of nonprobability sampling in which participants from the target population who meet the inclusion criteria of the study, and who are easily accessible due to geographical proximity, availability at a given time, or they are willing to take part in the study, are included. Physicians were invited to participate in the study either by email or through sharing the online questionnaire link to them through social media websites such as twitter.

Study instrument

Genere's questionnaire was developed by a panel of internal medicine physicians and specialist in health sciences research and diabetes affiliated with the National Institute of Health-funded Chicago Centre for Diabetes Transaction Research [23]. The questionnaire has identified the concept of individualising HbA1c as "choosing an HbA1C goal for each patient based on their characteristics". Physicians were asked whether they are familiar with this concept, using yes/no question format, and their agreement with this concept was measured using a 5-point Likert scale; ranged from strongly agree to strongly disagree. The frequency of the physicia's practice of HbA1c goals individualisation was also measured using a 5-point Likert scale; ranged from always to rarely. This was followed by asking physicians about their perspectives towards antidiabetic treatment de-intensification in terms of HbA1c goal and patients' factors that they consider important to undertake this approach. Furthermore, physicians were asked about their gender, years of practice, country of medical education, percentage of patients aged 18 years and above and 65 years and above, percentage of patients with type 2 DM referring to their clinics and percentage of patients with diabetic complications.

The second questionnaire was Grant and colleagues' questionnaire. It had been developed through conducting four focus groups with healthcare professionals including physicians working in primary care and diabetologists. In addition to factors identified based on the outcomes of the focus groups, Grant had also constructed his questionnaire based on previous literature [24, 25, 26]. The questionnaire explored subjective patient factors (adherence behaviour, specific medication requests and patient's desire to delay or avoid insulin injection), physician related factors (physician's current or prior practice, size of practice, expert guidelines or hospital algorithms, physician's assessment of patient's health status and comorbid conditions), clinically measured patient data (age, weight, and last measured glycated haemoglobin [HbA1C]) and cost of antidiabetic medications chosen by the physician. Physicians were asked to choose between three choices regarding the degree of importance of each variable ("major consideration," "minor consideration," or "not a consideration").

Sample size

Using a confidence interval of 95%, a standard deviation (SD) of 0.5, a margin of error of 5%, the required sample size was 385 participants.

Statistical analysis

Data were analysed using the SPSS software, version 25. The descriptive analysis was reported as mean (μ) ± SD for normally distributed quantitative variables and as median (Interquartile range (IQR)) for non-normally distributed variables. Descriptive statistics was used to describe the respondents' basic information. Categorical data were reported as percentages and frequencies. Logistic regression analysis and Chi-squared test were used to assess the relationship between physicians' demographics and their awareness of, agreement with, and practice of HbA1c individualisation and antidiabetic treatment de-intensification. In addition, it was used to compare the response of physicians from different specialties. Physicians and practices covariates were dichotomised at the median (due to the skewness of the data), where years of experience were classified as equal to or more than 3 years and less than 3 years, size of practice as equal to or less than 1,000 patients and more than 1000 patients, percentage of patients aged above 18 years or 65 years as equal to or less than 40% and more than 40%. A confidence interval of 95% ($p < 0.05$) was applied to represent the statistical significance of the results and the level of significance was assigned as 5%.

Results

A total of 358 physicians were invited to participate in the study via email, of which 205 physicians have participated in this study with a total response rate of 57.3%.

Physicians and Practice Characteristics

The majority of participants were males (n = 138, 67.3%) and approximately half of them had family medicine speciality (n = 98, 47.8%). The majority of physicians completed their medical education in Saudi Arabia (n = 136, 66.3%) with a median duration of 5.00 (IQR 3.00–10:00) years of practice. Around 88.8% (n = 182) of the physicians had an estimated monthly panel size of ≤ 500 patients. The vast majority of the physicians (n = 167, 81.8%) reported that more than 40% of their patients are aged 18 years and above, approximately half of physicians had patients with type 2 DM (n = 110, 53.6%) and a quarter of the sample (n = 55, 26.9%) had patients suffering from diabetic complications. Table 1 shows the details of physicians and practices characteristics.

Table 1
Physicians and practice characteristics (n = 205)

		Number (%)
Gender	Female	67 (32.7)
	Male	138 (67.3)
Speciality	Endocrinology	30 (14.6)
	Family Medicine	98 (47.8)
	Internal Medicine	32 (15.6)
	Paediatrics	6 (2.9)
	General Practitioner	39 (19.0)
Country of medical education	Local education	136 (66.3)
	Europe	5 (2.4)
	Asia	41 (20.0)
	America	14 (6.8)
	Africa	8 (3.9)
	Australia	1 (0.5)
Years of practice	Median ± IQR (years)	5.00 (3:00−1:00)
	0−4 years	96 (46.8)
	5−9 years	57 (27.8)
	10−14 years	25 (12.2)
	15−19 years	7(3.4)
	20−24 years	12 (5.9)
	≥ 25 years	8 (3.9)
Monthly size of patient panel	0−100 patient	67 (32.7)
	101−250 patient	68 (33.2)
	251−500 patient	47 (22.9) .8)
	501−1,000 patient	17 (8.3)
	1,001−1,500 patient	3 (1.5)
	> 1,500 patient	3 (1.5)

		Number (%)
% Patients > 18 years old	0−20%	21 (10.2)
	21−40%	17 (8.3)
	41−60%	37 (18.0)
	61−80%	61 (29.8)
	81−100%	69 (33.7)
% Patients > 65 years old	0−20%	71 (34.6) (31.6)
	21−40%	41 (20.0) 1)101 (24.8)
	41−60%	56 (27.3))
	61−80%	32 (15.6)
	81−100%	5 (2.4)
% Patients with T2DM	0−20%	40 (19.5)
	21−40%	55 (26.8)
	41−60%	47 (22.9)
	61−80%	48 (23.4)
	81−100%	15 (7.3)
% Patients with T2DM and diabetic complications	0−20%	89 (43.3)
	21−40%	61 (29.8)
	41−60%	35 (17.1)
	61−80%	17 (8.3)
	81−100%	3 (1.5)

HbA1c Goals Individualisation

The majority of physicians (n = 183, 89.3%) reported that they were familiar with the concept of HbA1c goals individualisation. The vast majority (n = 170, 83%) of those who are familiar with the concept of HbA1c goals individualisation agreed with it. However, only 66.3% of them (n = 136) reported that they apply this concept in their daily practices most of the time or in all cases (Table 2).

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Table 2
Physicians' perspectives and practices of HbA1c individualisation

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		Number (%)
"Are you familiar with the concept of individualising HbA1c goals?" (n = 202)	Yes	183 (89.3)
	No	19 (9.3)
	Missing data	3 (1.5)
"To what extent, do you agree with individualising HbA1c goals?" (n = 183)	Strongly disagree	10 (5.5)
	Somewhat disagree	1 (0.5)
	Neither agree nor disagree	2 (1.0)
	Somewhat agree	52 (25.4)
	Strongly Agree	118 (57.6)
"How frequently do you individualise HbA1c goals?" (n = 183)	Never	10 (5.5)
	Rarely	6 (2.9)
	Sometimes	31 (15.1)
	Most of the time	88 (42.9)
	Always	48 (23.4)

Physicians' familiarity with the concept of HbA1c goals individualisation was significantly associated with their years of experience (OR: 1.07 (95% CI 1.01–1.13)) and percentage of T2DM patients with complications who visit their clinics (41–60%) (OR: 2.69 (95%CI 1.01–7.13). Physicians' agreement with the concept of individualising HbA1c goals did not significantly differ between physicians from different demographics.

Diabetes Therapy De-intensification

More than half of the participated physicians (58.5%; n = 120) reported that they do not initiate conversations with their patients about discontinuing or reducing the dose of their medications even if they had a stable HbA1c values for one year. Some physicians (n = 48, 23.5%) used a predefined HbA1c values as a cut-off point to initiate conversations about de-intensifying diabetes therapy. Around 8.3% (n = 17) of physicians used individualised HbA1c levels to initiate this conversation. Different predefined HbA1c levels were used by physicians to initiate conversations on antidiabetic therapy de-intensification. However, 19% (n = 39) of physicians used HbA1c levels that ranged between 6.0% and 7.0%, as a predefined HbA1c levels. The three most important clinical situations in which the physicians initiate a

conversation about antidiabetic therapy de-intensifications were: if the patient has experienced symptoms that could be related to their medications (22.4%, n = 46), the patient is at risk for polypharmacy (15.1%, n = 31), or showed non-adherence to medications or having concerns about the cost of their medications (8.8%, n = 18) (Table 3). Initiating a conversation about antidiabetic therapy de-intensification was associated (OR: 2.14 (95%CI 1.10–4.17)) with percentage of patients aged 18 years and above who visit physicians' clinics (81–100%).

Table 3
Physicians' perspectives and practices of antidiabetic therapy de-intensification

		Number (%)
"In general, if your patient with type 2 diabetes has a stable HbA1c level for 1 year, do you ever initiate conversations about discontinuing or reducing the dose of their diabetes medications?" (n = 191)	Yes	71 (34.6)
	No	120 (58.5)
	Missing data	14 (6.8)
"At what HbA1c level do you initiate this conversation?" (n = 71)	< 5.0%	3 (4.2)
	< 5.7%	4 (5.6)
	< 6.0%	15 (21.1)
	< 6.5%	13 (18.3)
	< 7.0%	11 (15.5)
	< 8.0%	2 (2.8)
	Depends on patient characteristics	17 (24)
	Missing data	6 (8.5)
"In what other clinical situations do you initiate this conversation?" (n = 71)	When a patient has symptoms that could be from their medications	46 (64.8)
	When a patient is at risk for polypharmacy	31 (43.7)
	When a patient raises concerns about the costs of medications	18 (25.4)
	When a patient may not be taking the medicine as prescribed	18 (25.4)
	When a patient is diagnosed with a condition that significantly reduces their life expectancy	17 (23.9)

Physicians Consideration of Antidiabetic Medication Choice

When selecting the antidiabetic medication for patients, physicians showed a higher consideration to last measured HbA1C level (94.9%, n = 168), comorbid conditions co-existed with diabetes (93.8%, n = 166), their assessment of patient's health status (88.1%, n = 156). Physicians showed a minor consideration to subjective patient factors such as specific medication requests by the patient (53.1%, n = 94). This was followed by physician's current or prior practice (43.5%, n = 77) and medication costs (44.6%, n = 79) (Fig. 1).

Discussion

This study showed that most physicians (89.3%, 183) were familiar with the concept of individualising HbA1c goals for patients with DM, and the majority (83%, n = 170) agreed with the concept and apply it always or sometimes (66.3%, n = 136) it in their daily practices. Nevertheless, only 34.6% (n = 71) declared that they would initiate a conversation to de-intensify diabetes therapy with their patients if they were stable for one year. Regarding the factors that mostly considered by physicians when prescribing antidiabetic medications, patients' comorbidity, patients' health status and last measured HbA1c level were the most considered factors. Such a trend is alarming as recent studies revealed an increased risk of admission for hypoglycaemia in DM patients aged ≥ 50 years. Hypoglycaemia is a key risk of intensive pharmacological treatment with antidiabetic drugs [27]. However, de-intensification trends vary, wherein one study, general practitioners do not initiate treatment in older patients because of potential hypoglycaemia and will prescribe the antidiabetic drug only when HbA1c levels exceeded recommended values [28]. Another recent retrospective study involving 3,186 patients, reported that the de-intensification of treatment options is uncommon for older patients with DM [29].

Although healthcare guidelines recommend treatment individualisation [7,8], a considerable number of physicians (9.3%, n = 19) stated that they were not familiar with the concept of HbA1c goals individualisation despite that the majority of patients they treat are above 65 years. Such unawareness about this concept might increase the risk of 'over-treatment' of patients with type 2 DM, which may cause additional harm and cause adverse drug reactions such as hypoglycaemia particularly for elderly [30, 31, 32]. Many factors could be associated with diabetes overtreatment by healthcare professionals such as being unaware of individualising treatment target [33]. Physicians' familiarity with the concept of HbA1c goals individualisation was significantly associated with physicians' years of experience and percentage of T2DM patients with complications who visit their clinics. Physicians' agreement with the concept of individualising HbA1c goals did not significantly differ between physicians from different demographics. Male physicians showed a higher possibility of initiating conversations about antidiabetic therapy de-intensifications. Unlike a previous study, which showed that female physicians had a higher possibility of initiating such conversations with their patients [20]. Previous studies showed that male physicians usually have shorter durations of consultations with their patients than female physicians, ask them less questions, and do not discuss physical activities and lifestyle with them [34, 35, 36, 37, 38]. The process of initiating antidiabetic therapy de-intensification conversations is restricted by the limited time spent in clinical practice during the provision of healthcare to patients, as such conversation requires a thorough discussion of the risks and benefits related to antidiabetic therapy de-intensification [20].

In this study, almost one third (34.6%) of the physicians reported that they would initiate a conversation about antidiabetic therapy de-intensification with patients who maintained stable for one year. Pre-defined HbA1c levels were used by many physicians as a cut-off point to initiate their discussions about antidiabetic therapy de-intensification, with 30.9% of them using HbA1c levels that ranged from 6% and lower. Only 24% (n = 17) of physicians reported that such discussions depend on patient's characteristics. However, variations in the HbA1c level being considered by physicians reflects the differences in physicians' awareness about guideline recommendations and their uncertainty on how and when to de-intensify antidiabetic therapy. Such physicians' unawareness may increase the risk of experiencing adverse events by patients due to over-treatment. Some patients, such as those with cardiovascular diseases could be at a higher risk of antidiabetic therapy over-treatment, and their physicians should consider antidiabetic therapy de-intensification at an earlier stage [20, 39]. Some studies suggested the added value of de-intensification that outweighs the harm, particularly in older patients. However, to date, there is no solid established strategies on how to implement antidiabetic therapy de-intensification to prevent the harm of overtreatment [20, 40].

The current study found that physicians have various considerations when prescribing antidiabetic therapy for their patients. The majority of physicians highly considered patients' comorbidity, patients' health status and last measured HbA1c level. Majority of physicians also reported that the most commonly unconsidered factors are subjective patient factors such as specific medication request and medication cost. Healthcare professionals should employ a patient-centred approach that considers these factors as they are associated with better disease management. The provision of care for diabetic patients in Saudi Arabia is not limited to specialised physicians, it can be provided across the spectrum of healthcare including primary healthcare facilities that provide services to non-communicable diseases, which include diabetes [41]. For this reason, guideline bodies need to set recommendations for approaches to de-intensify treatment options for DM patients that cater to the diversity of the disease itself as well as the healthcare providers.

Strengths and limitations

This study has several strengths, it is the first study to be conducted in Saudi Arabia exploring physicians' perspectives towards antidiabetic therapy de-intensification, and factors affecting their treatment choice. Also, this study included physicians from different specialties, which ensured the generalisability of the findings. In addition, recruiting participants using different methods e.g. social media and email ensured the good response rate. On the other hand, this study has some limitations. The responses could be prone to a social desirability bias because some physicians may not wish to show their unawareness about healthcare recommendations and guidelines regarding the need for treatment de-intensification. However, we expect that this is minimal, since around 9.3% of the participants reported that they are not familiar with such concept. In addition, the use of the questionnaire in this study could limit the options to the physicians in some aspects and restrict their answers to what were already identified e.g. the subjective patient factors that affect the physicians' choice of treatment.

Implications for practice

This research addressed the 'over-treatment' problem among patients with type 2 diabetes in the country. The study has also revealed the attitudes and perspectives of physicians towards treatment de-intensification. This would help policy makers to interpret the importance of such issue and propose guidelines for the management of type 2 diabetes in the region, particularly addressing the importance of treatment de-intensification. In addition, this would help in reducing adverse events and mortality rates in this group of patients, and improve the economic and health outcomes.

Suggestions for future work

As there is a scarcity of studies examining physicians' perspectives regarding treatment de-intensification in type 2 diabetes in the Middle East, it will be interesting to conduct more studies using different methods e.g. interviews or focus groups. This will ensure the exploration of all factors that could affect the perspectives of physicians regarding this issue, and hence, drawing a broader picture about the management of such growing disease in the area. This will assist in designing the appropriate protocols and guidelines for the management of type 2 diabetes.

Conclusions

The findings of this study showed that physicians should initiate conversation about antidiabetic therapy de-intensification with their patients with a greater emphasis on their clinical profile such as their comorbidity or being on polypharmacy. The cut-off point for this conversation should be based on patients' clinical profile and tailored to their health status. Physicians should educate their patients after implementing this approach to monitor their blood glucose levels on a continuous basis to have a better control, and to decrease the probability of experiencing any potential drug adverse events. Continuous education programmes to healthcare professionals should focus more on updating physicians' knowledge about contemporary practices and highlight the importance of revising patients' therapy on continuous basis to implement any necessary treatment de-intensification. This would decrease the possibility of unintended overtreatment of patients that might increase their potential harm due to adverse drug events.

Abbreviations

DM: Diabetes Mellitus; HbA1c: Glycated haemoglobin; IQR: Interquartile range

Declarations

Ethics approval and consent to participate

Permission and approval for the use of the study questionnaires was sought from the corresponding authors. Participants were informed that by completing the online questionnaire, this would be considered written consent and agreement to participate in the study. The study has been approved by the Ministry of Health- Ethical Committee-Saudi Arabia.

Consent for publication

Not applicable.

Availability of data and materials

Raw data of the study are available upon request to the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

AN conceived the study, wrote the methods, conducted the formal analysis, and coordinated the study. B.A, H.A, F.M.T, and N.S.B contributed to data collection. AN, EZD, and ZKA drafted the manuscript with input from all authors. All authors have been involved in drafting the manuscript or revising it critically for important intellectual content. All authors read and approved the final manuscript. All authors have revised the final draft and agreed for the submission.

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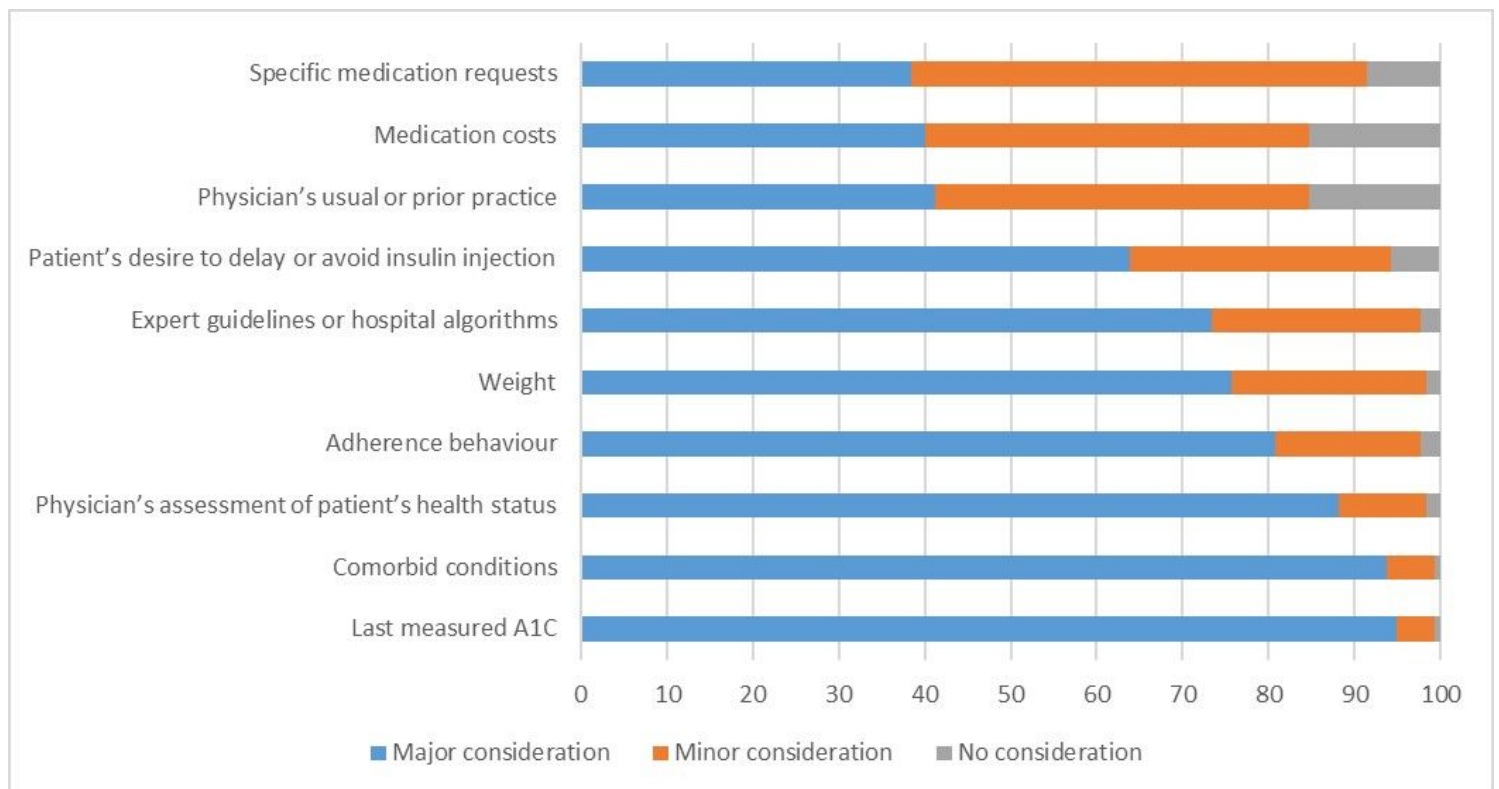
Figures

Figure 1

Physicians considerations when prescribing antidiabetic medications (n= 205)

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