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Physician–patient communication at prescription of an additional oral drug for type 2 diabetes and its links to patient outcomes – New findings from the global IntroDia® study

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ABSTRACT

Aims: To investigate experiences of people with type 2 diabetes (T2DM) at the clinic visit when an additional oral antidiabetes drug (OAD) is prescribed, and how this affects their quality of life, self-management and key outcomes.

Methods: We surveyed adults with T2DM from a large multinational study of patient–physician communication during early T2DM treatment (IntroDia®). We examined their experiences when an additional OAD is prescribed ("add-on") after initial OAD monotherapy, focusing on 24 key conversational elements, overall patient-perceived communication quality (PPCQ), and associations with current patient-reported outcomes. The links between PPCQ and people's efforts to delay add-on therapy were also assessed.

Results: 4235 people with T2DM prescribed an additional OAD, or a combination of two, were analysed. Exploratory factor analyses of the conversational elements during add-on yielded three coherent, meaningful factors: Encouraging (Cronbach's $\alpha = 0.62$), Collaborative ($\alpha = 0.81$), and Discouraging ($\alpha = 0.81$). PPCQ was positively associated with Encouraging ($\beta = +1.252$, $p < 0.001$) and Collaborative ($\beta = +1.206$, $p < 0.001$), but negatively associated with

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Discouraging (β = −0.895, $p < 0.001$). Better PPCQ at add-on was associated with less diabetes distress, greater well-being and better self-care at the present time. Approximately 20% of people bargained (two-thirds successfully) with their physician to delay additional medication. Non-bargaining individuals reported significantly better mean PPCQ, diabetes distress, well-being and self-care than those who bargained.

Conclusions: Encouraging and patient-inclusive conversations at add-on moments may improve patient well-being and self-care outcomes. People with T2DM who attempted to delay additional medication reported poorer PPCQ and outcomes.

1. Introduction

Receiving the diagnosis of type 2 diabetes mellitus (T2DM) can evoke strong emotional responses, affecting a person's short- and long-term attitudes towards the condition [1–8] and, depending on how the individual responds to the diagnosis, may contribute to suboptimal glycaemic control [3]. In addition, messages communicated and/or actions undertaken by the physician at this critical moment can also influence attitudes of their patients [9]. Effective physician–patient dialogue at diagnosis can help people with T2DM to better understand and manage their condition which, in turn, can lead to improved clinical outcomes [10–12].

Physician–patient communication was explored in the recent IntroDia® study, which is, to date, the largest international, non-interventional, retrospective study dedicated to understanding and optimising conversations between physicians and patients with T2DM [13]. In contrast to previous surveys [14,15], IntroDia® focused specifically on the interactions between physicians and patients during early treatment of T2DM, when patient-physician conversations may have a lasting impression on people's attitudes towards T2DM and their motivation for ongoing disease self-management. The study was based on two separate surveys: the first involved 6753 physicians treating people with T2DM, and the second included 10,139 people with T2DM. IntroDia® was designed to provide a greater understanding of the potential importance of these early conversations, including the experiences of both physician and person with T2DM, and to identify how current conversations can be improved at two potentially key events – diagnosis and when additional oral medication is prescribed ("add-on") – leading to improved self-care and well-being of people with T2DM. The findings from the IntroDia® physician survey have been reported previously for the diagnosis conversation [16], and physician experiences of the add-on conversation are presented in the companion manuscript in this issue.

Findings from the diagnosis survey of people with T2DM in IntroDia® have also been reported [13]. These revealed that the quality of patient–physician communication (as reported by the person with T2DM) may have an important impact on patient outcomes, such that better communication at diagnosis may contribute to people with T2DM subsequently experiencing greater well-being and more effective disease self-management [13].

In the follow-up study reported here, we investigated the experiences of people with T2DM at the add-on moment – i.e., the clinic visit when an additional oral diabetes drug (OAD) is prescribed after initial OAD monotherapy – and examined whether this conversation may also influence their well-being and self-care behaviours over time. As with the diagnosis conversation [2], it may be that if the physician clearly explains the situation at add-on, while providing a specific care plan and a sense of hope that the person – with help from the physician and support staff – can successfully manage their T2DM, then the person may be more likely to adopt long-lasting positive changes in their attitude and self-care behaviours. However, the specific elements of the add-on conversation – i.e., what the physician says or does – that might influence their patient's attitudes and behaviours over the long term are unclear.

As part of this investigation into the person with T2DM's perspective on the add-on conversation, we also specifically evaluated the phenomenon of patient bargaining, i.e., an attempt by the person with T2DM to persuade their physician to delay prescribing additional medication. Although the physician's decision to prescribe additional medication for T2DM is based on evidence-based assumptions of its benefit, people with T2DM may view additional medication as a sign of failure and/or poor prognosis and be reluctant to take it [17]. As concordance between patient and physician preferences in T2DM is associated with better patient self-care [18], bargaining would therefore be anticipated to worsen outcomes, even if unsuccessful. Thus, it is of importance to assess the incidence and success rate of bargaining in everyday clinical care.

2. Materials and methods

2.1. *Study design and participants*

IntroDia® was planned by a multidisciplinary international advisory board. The study design, details of which have been reported previously [13], involved separate, non-interventional, retrospective surveys of physicians and people with T2DM (who were not matched) at both diagnosis and the add-on clinic visit. Here, we focus on the survey of people with T2DM (conducted in 26 countries) that recorded experiences during the add-on conversation when an additional OAD is prescribed after initial monotherapy with an OAD. Eligible participants were aged ≥18 years who had a confirmed diagnosis of T2DM ≥ 1.5 years previously, and reported that they had received their diagnosis from either a primary care physician or physician specialising in diabetes. The add-on moment (in the conversation with the physician) was defined as when the physician told their patient with T2DM they needed to take either another pill in addition to the first medication or a different pill combining two OADs. We excluded people receiving injectable antidiabetes medications, people taking more than three OADs, and people who had had T2DM for more than five years.

The survey followed national and international guidelines for the conduct of non-interventional studies, and was reviewed and approved by an independent institutional review board (Aspire IRB). The survey followed guidelines for the conduct of market research and pharmaceutical market research from the European Society for Opinion and Marketing Research [19], the European Pharmaceutical Market Research Association [20] and the Council of American Survey Research Organizations [21]. GfK, an international market research organisation, translated the survey questionnaire, conducted the fieldwork, prepared the data files, and performed the initial data analyses.

2.2. *Survey battery*

The survey battery comprised three main sections: reported experiences during the add-on conversation, patient perception of the quality of the physician's communication (patient-perceived communication quality [PPCQ]) during the add-on conversation, and current attitudinal and behavioural outcomes [13]. First, reported patient experience was assessed via a specific questionnaire, which was developed to assess the early conversations in T2DM. The questionnaire included an instrument to record the person's recall of what their physician said or did during the add-on conversation. Based initially on the Patient Assessment of Chronic Illness Care scale (PACIC) [22],[1] this was modified in order that the items focused more explicitly on early experiences of people with T2DM. The advisory panel reviewed and revised existing items and constructed additional ones, based on initial hypotheses relating to the early physician–patient interactions and in response to a review of discussions regarding the add-on experience with physicians and people with T2DM. The final instrument consisted of 24 items ("conversation elements"). In addition, the questionnaire contained the following question designed to assess the occurrence of bargaining by the person with T2DM: "When you were told that you had to take an additional medication to treat your diabetes, did you try to convince your doctor to postpone the additional medication for a few weeks or months, and promise him/her to take even better care of your diabetes?"

In the second section, PPCQ was evaluated using the approach by Ratanawongsa and colleagues [23] – combining eight items from the Consumer Assessment of Healthcare Providers and Systems [24,25], Trust In Physician Scale [26,27], and Interpersonal Processes of Care [28] questionnaires [13]. The response options for the TIPS and IPC items were modified to match the CAHPS 4-point scale options ("never"; "sometimes"; "usually"; and "always").

In the final section, patient-reported outcomes at the present time were determined by the WHO-5 well-being index[2] and Diabetes Distress Scale[3] (to evaluate current diabetes-related stress), and the Summary of Diabetes Self-Care Activities (SDSCA) [29] measure to evaluate current self-care behaviour including diet, exercise and medication adherence [13].

The English language survey battery was reviewed, approved and tested before translation into local languages where needed. Back-translation and harmonisation followed to ensure validity with the original questionnaire, prior to pilot-testing and active fieldwork, as described previously [13].

2.3. *Statistical analyses*

Descriptive statistics were used to summarise participant characteristics and other variables. An exploratory factor analysis (EFA) grouped the 24 conversation elements into patient-perceived dimensions to identify the underlying factors [13]. Conversation element groupings were investigated using Principal Components Analysis with Varimax rotation. The Kaiser-Guttman rule [30] and Catell's scree plot [31] were used to determine the number of factors to retain before rotation. The cut-off for factor loading was pre-specified as 0.45. Internal consistency of the items identified within each factor was assessed using Cronbach's α coefficient. Pearson's product-moment correlation coefficient (r) was used to assess the degree of linear dependence between factors.

For PPCQ, one composite score over all eight items was calculated, and a stable path model was applied to investigate firstly the association between factors and PPCQ, and secondly the association between PPCQ and patient-reported outcomes. Analyses were performed using the following packages: IBM SPSS Statistics 22 (Chicago, IL, USA); IBM SPSS Amos 22.0.0 (Build 1384); SAS/STAT software (Version 9.4 or greater; SAS Institute Inc., Cary, NC, USA); and R version 3.2.3.

3. Results

3.1. *Add-on conversation*

The IntroDia® patient survey examining the add-on conversation was completed by 4235 people with T2DM via an online self-report questionnaire between December 2013 and January 2015. The median time elapsed since add-on conversation was 6 months (Q1–Q3 4–10 months; range 1–18 months). The mean age was 47.0 years (median age: 46 years), and approximately 52% of respondents were males. Participant characteristics are summarised in Table 1.

An EFA of the 24 conversation elements yielded three coherent, meaningful factors (Table 2). Two of these factors

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[2] ©Psychiatric Research Unit, Mental Health Centre North Zealand, University of Copenhagen, DK-3400 Hillerød, Denmark.

[3] DDS 5.8.15 ©William H. Polonsky, Lawrence Fisher.

Table 1 – Characteristics of the people with T2DM ($n = 4235$) who completed the survey about the conversation with their physician at the add-on moment.

	Individuals responding ($n = 4235$)
Sex, *n* (%)	
Male	2196 (52)
Female	2039 (48)
Mean age, years (SD)	47.0 (11.5)
Median age, years (range)	46.0 (19.0–92.0)
Median duration of diabetes, months (interquartile range, Q1–Q3)	31 (20–44)
Treating physician, *n* (%)	
Primary-care physician	2183 (52)
Specialist	2052 (48)

related to positive aspects of the add-on conversation: “Encouraging” encompassed conversation elements that were perceived by the patient as helpful and reassuring (e.g., “Told me why I have to take this additional medication”) (four elements; Cronbach’s $\alpha = 0.62$); “Collaborative” centred on establishing a patient–physician partnership to help the patient to create a treatment plan (e.g., “Asked what I would like to discuss about the impact of taking an additional medication for my diabetes”) (10 elements; Cronbach’s $\alpha = 0.81$). However, the third factor, “Discouraging”, related to negative aspects of the conversation, and grouped conversation elements that were perceived as apportioning blame for having to take additional OADs (e.g., “Told me that having to take an additional medication is mostly my fault, because of the way I had been living my life”) with conversation elements that contained information about the long-term prognosis (e.g., “Told me that the next step would be to take insulin to control my diabetes”) (eight elements; Cronbach’s $\alpha = 0.81$). The slightly lower Cronbach’s α value for the Encouraging factor compared with the Collaborative or Discouraging factors may have been due to the inclusion of an item with a relatively low factor loading (0.491). Overall, most of the items had factor loadings of between 0.5 and 0.7, indicating moderate correlation with each factor.

PPCQ was positively associated with the Encouraging ($\beta = +1.252$, $p < 0.001$) and Collaborative ($\beta = +1.206$, $p < 0.001$) factors, whereas it was negatively associated with the Discouraging factor ($\beta = -0.895$, $p < 0.001$) (Fig. 1).

Furthermore, better PPCQ at add-on was associated with less diabetes distress (DDS: $\beta = -0.391$, $p < 0.001$), greater well-being (WHO-5: $\beta = +0.542$, $p < 0.001$) and better self-care (SDSCA: exercise: $\beta = +0.561$, $p < 0.001$; diet: $\beta = +0.932$, $p < 0.001$; medication adherence: $\beta = +0.763$, $p < 0.001$) (Fig. 1).

Individual conversation elements that were associated with better PPCQ (in all cases, these were from the “Encouraging” and “Collaborative” factors) were reported to occur more frequently than elements associated with poorer PPCQ (all representative of the “Discouraging” factor) (Fig. 2). Notably, however, 40–50% of the respondents recalled Discouraging elements.

Mean global scores for communication quality and patient-reported outcomes are summarised in Supplementary Table 1.

3.2. *Patient bargaining at add-on*

Of the 4235 respondents, 80% ($n = 3377$) reported that they did not attempt to bargain with their physician when told that an additional medication to treat their diabetes was needed, while 20% ($n = 858$) of respondents did try to bargain. These two groups were generally similar in demographic characteristics, albeit the bargaining group was slightly younger (Table 3). Bargaining rates across countries are shown in Supplementary Fig. 1. Within the group who did bargain, 61% of respondents reported that they had successfully delayed the initiation of additional medication.

The mean PPCQ score (scale: 1 = poor to 4 = high [SD]) was significantly higher (indicating a better communication quality; $p < 0.001$) for patients who did not bargain (3.25 [0.71]) versus those who did (3.01 [0.68]). In addition, the non-bargaining group had lower mean DDS, higher mean WHO-5 well-being score, and higher mean SDSCA general diet and medication scores (all $p < 0.001$) (Supplementary Fig. 2).

When people were asked to recall the use of individual conversation elements by their physician, there were no significant differences in the reported use of Encouraging and Collaborative elements for people who bargained versus those who did not. However, people who bargained recalled a greater use of Discouraging conversation elements by their physicians compared with those who did not bargain ($p < 0.001$) with each Discouraging element recalled more frequently (in all cases, $p < 0.001$; Supplementary Table 2).

4. Discussion

4.1. *Conclusions*

Consistent with the findings from previous studies, these results from the IntroDia® survey support the importance of the physician–patient conversation during the early phase of T2DM treatment. Importantly, however, the current results are the first to demonstrate that PPCQ at the moment when an additional OAD is prescribed may influence the well-being and self-care behaviour of people with T2DM over time, similar to findings from the survey of the physician–patient conversation during diagnosis of T2DM [13].

As reported in the IntroDia® survey of people with T2DM at diagnosis [13], in the add-on survey Encouraging and Collaborative conversation elements were both positively associated with PPCQ; in turn, an increase in PPCQ was significantly associated with less current diabetes-related distress, greater current well-being and better current self-care. The conversation elements in the Encouraging factor are associated with giving people a sense of continuing hope and reassurance at a time when a change in their T2DM now warrants additional intervention, while conversation elements in the Collaborative factor focus more on providing support and re-affirming the partnership between the person with T2DM and their healthcare provider.

Table 2 – Exploratory factor analysis of add-on conversation elements revealing three patient-perceived factors on patient-perceived communication quality.[a]

Factor	Conversation element[b]	Factor loading 1	2	3
Encouraging	Told me that the new medication would help me to control my diabetes (16)[c]	**0.685**	0.111	<0.001
	Told me why I have to take this additional medication (5)	**0.670**	0.110	−0.023
	Explained to me how the additional medication would help to control my diabetes (17)	**0.609**	0.310	0.016
	Told me that with good care and effort, odds are good that I could live a long and healthy life despite the additional medication (20)	**0.491**	0.402	0.100
Collaborative	Asked to talk about any concerns with the new diabetes medications being prescribed (1)	0.014	**0.671**	0.163
	Helped to adjust my treatment plan that I could do it in my daily life (3)	0.137	**0.636**	0.044
	Asked what I would like to discuss about the impact of taking an additional medication for my diabetes (24)	0.218	**0.621**	0.124
	Gave me informational materials (e.g. brochures, leaflets, contact details of diabetes associations, internet links) related to diabetes (8)	0.039	**0.596**	0.163
	Contacted me after the visit to see how things were going (4)	−0.184	**0.594**	0.244
	Encouraged me to ask him/her questions (7)	0.220	**0.590**	−0.040
	Told me how the additional medication would affect my life (18)	0.185	**0.546**	0.163
	Asked questions, either directly or on a survey, about my health habits (2)	0.233	**0.546**	0.110
	Told me that I did not do anything wrong that resulted in having to take the additional medication (12)	0.136	**0.531**	0.146
	Told me that I am not sicker, even though I have to take the additional medication (6)	0.130	**0.523**	0.053
Discouraging	Told me that I needed more medication because I had failed to take good enough care of myself (14)	−0.038	0.144	**0.712**
	Told me that having to take an additional medication is mostly my fault, because of the way I had been living my life (13)	−0.070	0.185	**0.695**
	Told me that I have to take the additional medication because my diabetes is out of control (9)	0.200	−0.034	**0.679**
	Told me that my diabetes was getting worse (10)	0.001	0.012	**0.641**
	Told me that if someday I need to take insulin, it would be my own fault (22)	−0.152	0.285	**0.622**
	Told me that I have to take the additional medication because the previous therapy has failed (11)	0.157	0.010	**0.616**
	Told me that the next step would be to take insulin to control my diabetes (23)	−0.081	0.224	**0.606**
	Told me that I have to take the additional medication because over time, diabetes gets more difficult to treat (15)	0.082	0.308	**0.514**

[a] The factor analysis comprised all people with T2DM responding to the survey about the add-on conversation (*n* = 4235). The higher factor loading for each challenge is in bold.

[b] The following conversation elements did not load onto any factor: "Told me that taking an additional medication did not automatically mean that I will have to take insulin at some point"; "Told me that the new medication would improve my quality of life".

[c] Conversation element numbers shown in parentheses are also shown in Fig. 2.

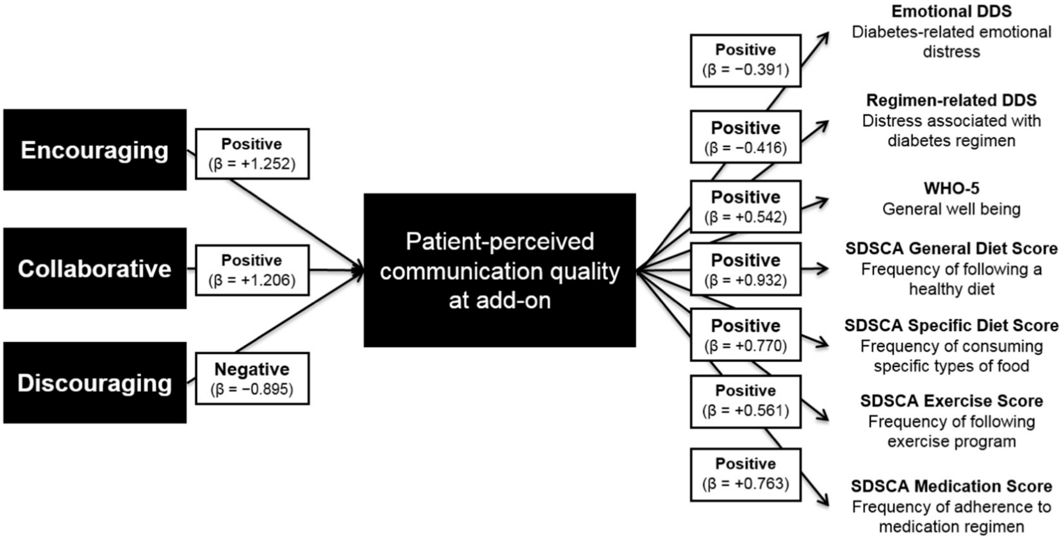

Fig. 1 – Impact of the 3 patient-perceived factors on patient-perceived communication quality and how, in turn, this affects patient self-reported outcomes. Linear regression models conducted in AMOS statistical software. Sample: add-on patients, *n* = 4235. All β values were statistically significant ($p < 0.05$). For DDS outcomes only, a negative β value represents a decrease in distress and therefore a more favourable outcome.

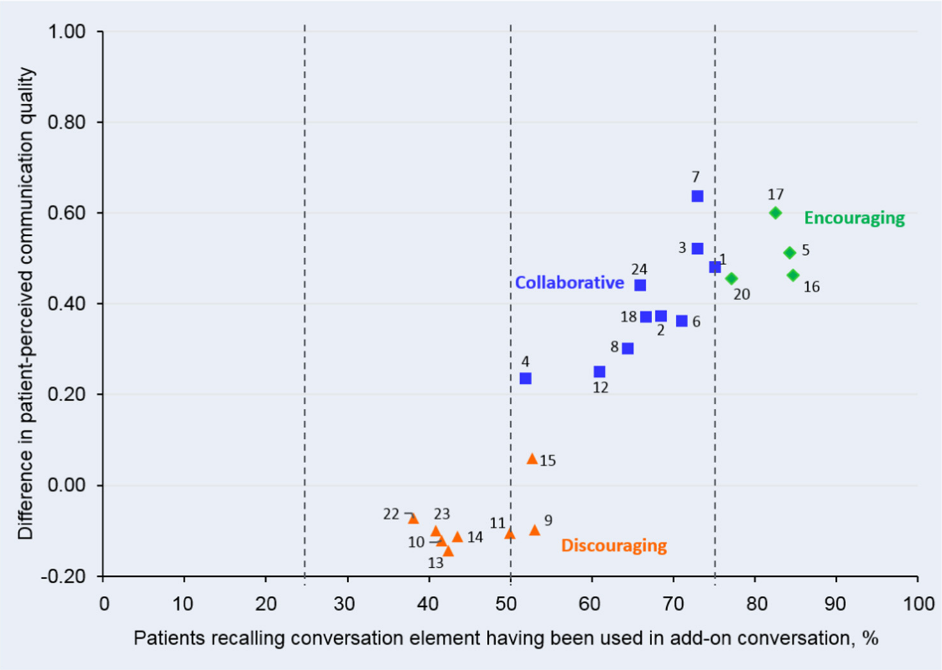

Fig. 2 – Conversation elements (item numbers) in add-on conversations: percentage of patients recalling physician use versus difference in patient-perceived communication quality. The difference in communication score is the number of patients who reported recalling each conversation element minus those who did not recall.

In contrast, conversation elements in the Discouraging factor are perceived by people with T2DM as negative aspects of the physician–patient conversation, with people being blamed for the progression of their T2DM, and/or receiving bad news about its prognosis. Not surprisingly, the Discouraging factor was associated with poorer PPCQ, which would be anticipated given the psychological impact that hearing these conversation elements would have on the person with T2DM.

These findings suggest that if physicians use conversation elements at the add-on moment perceived as encouraging (e.g., “Told me that the new medication would help me to control my diabetes”) or collaborative (e.g., “Asked to talk about any concerns, fears or questions with the new diabetes medications being prescribed”), this may enhance PPCQ, leading to better patient-reported outcomes over time. Likewise, physician use of conversation elements perceived as

Table 3 – Characteristics of the survey respondents grouped by 'Did not bargain' versus 'Did bargain'.

	Did not bargain (n = 3377)	Did bargain (n = 858)
Sex, n (%)		
Male	1729 (51)	467 (54)
Female	1648 (49)	391 (46)
Median age, years (range)	48 (19–87)	42 (19–92)
Median duration of diabetes, months (interquartile range, Q1–Q3)	31 (24, 20–44)	29 (23, 18–41)
Treating physician, n (%)		
Primary-care physician	1727 (51)	456 (53)
Specialist	1650 (49)	402 (47)

discouraging (e.g., "Told me that I needed more medication because I had failed to take good enough care of myself"; "Told me that my diabetes was getting worse") may reduce PPCQ at the add-on moment, leading potentially to worse patient-reported outcomes. In total, this suggests that while there is a need to inform people with T2DM about their prognosis, there may be value in making certain that it is framed in as positive and encouraging a light as possible.

Of particular interest from the survey is the frequency with which people with T2DM recalled individual conversation elements from their add-on conversation. The elements used by physicians that had the strongest positive association with self-reported outcomes (that is, encouraging and collaborative elements) were also the ones most frequently reported by people with T2DM to occur. However, discouraging conversation elements were also recalled, albeit less frequently, by approximately half of the sample of people with T2DM. These data suggest that a person who leaves the clinic with encouraging messages about his/her T2DM is more likely to remember these, and the experience may be more likely to have a positive influence on their disease self-management over time.

We also looked at the effect of patient bargaining on self-reported outcomes. Our findings suggest that approximately one fifth of people with T2DM are so reluctant to start an additional medication that they actively bargain with their physicians to postpone doing so. These individuals, compared with their non-bargaining counterparts, reported poorer PPCQ during the add-on conversation, and greater diabetes distress, poorer well-being and worse self-care at the time of survey completion.

Further research is required to help understand why people with T2DM bargain and seek to delay additional treatment. From the physician's perspective, implicit in their decision to prescribe additional medication for T2DM are the evidence-based assumptions that achieving glycaemic control is beneficial; that pharmacotherapy regimens will almost inevitably require intensification due to the progressive nature of the disease; and that this intensification should occur promptly [17]. However, the perceptions of their patients may differ markedly. In a series of focus groups with people with T2DM in the US, it emerged that most individuals had negative perceptions of beginning medication, viewing it as a sign of personal failure and an increased burden [17]. Furthermore, these individuals equated the intensification of medication with increased risk of diabetes-related complications. This discordance between healthcare provider and patient has implications for treatment success, as concordance between patient and physician preferences in T2DM is associated with better patient self-care [18]. Because the focus group findings may not be generalisable to the entire population of people with T2DM, population-based surveys are required to validate the findings. Some insight may be gleaned from the IntroDia® survey presented here, where there was a significant positive association between the use of discouraging conversation elements by the physician and patient bargaining at the add-on moment. However, the underlying reason for this is not clear. Some people with T2DM may be more likely to bargain after hearing predominantly negative statements about their condition and feel blamed for the need for add-on therapy. Alternatively, physicians may be inclined to use more discouraging statements with patients who bargain in an attempt to stop the patient from negotiating a delay to his/her treatment.

4.2. *Limitations and strengths*

Key strengths of this analysis are the large size (4235 respondents from 26 countries) and homogeneity (20–41 months since diagnosis) of its sample of people with early T2DM. There are, however, a number of limitations to consider. For example, the observational nature of the study means that the associations observed may not necessarily be causal, as reverse causality and/or bidirectional relationships cannot be excluded. Furthermore, the respondent's answers at the time of survey may not have accurately reflected the exact conversation that took place with their physician during the add-on moment, which for some respondents was up to 18 months earlier. In addition, the study participants may not have been representative of people with T2DM in general, as they may have been more motivated and shown a greater interest in learning about their T2DM, compared with the general population. As such, these people with T2DM may have had a more positive perception of the quality of their physician's communication. Furthermore, different cultural beliefs and attitudes to the physician–patient relationship between countries may also have influenced overall participant responses.

4.3. *Summary*

In summary, the findings from the 26 countries surveyed in IntroDia® suggest that PPCQ at the add-on conversation, heavily influenced by key conversation elements occurring during that clinic visit, may have an important impact on the outcomes of people with T2DM. In addition, around 20% of people with T2DM actively bargained to delay add-on treatment and, compared with non-bargaining individuals, reported poorer PPCQ during that conversation and, over time, greater diabetes distress, poorer well-being and self-care. Better patient-physician communication at add-on may contribute to people with T2DM subsequently experiencing less diabetes distress, greater well-being and more successful disease self-management.

Conflict of interest

SE has been a consultant and paid speaker for Boehringer Ingelheim and Eli Lilly. AB has been a consultant for Abbott, Boehringer Ingelheim, Lifescan Canada and Sanofi on programmes for the International Diabetes Federation. SD has been a consultant for Abbott, AstraZeneca/Bristol-Myers Squibb, Boehringer Ingelheim, Eli Lilly, Johnson & Johnson, Novo Nordisk and Sanofi, and has been a paid speaker for OmniaMed and SB Communications. AA has been a consultant for AstraZeneca and Boehringer Ingelheim. MC is a shareholder in RIO Weight Management Ltd, has received research funding from Cambridge Weight Plan, Lighter Life and Novo Nordisk, and has been a consultant and/or paid speaker for Boehringer Ingelheim, Eli Lilly, Janssen, Merck Sharp & Dohme and Novo Nordisk. VG, FN, JL, and JE are employees of Boehringer Ingelheim. WHP has been a consultant for Abbott, Astra Zeneca, Boehringer Ingelheim, Dexcom, Eli Lilly, Intarcia, Novo Nordisk, Roche Pharmaceuticals and Sanofi.

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Author contributions

SE, AB, SD, MC, FN, JL, JE and WHP were involved in the design of the survey, and VG provided the statistical analysis. All authors contributed to the interpretation of the data, and gave input on, reviewed, and approved the final manuscript.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.diabres.2019.01.020.

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